THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIV. No. 587.] LONDON, AUGUST 11, 1874. [26TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
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They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
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GAS-WORKS OF ANY EXTENT,
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JOSEPH COWEN and CO.,
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Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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J. & W. ROMANS, Consulting Gas Engineers and Coal Factors, of Edinburgh and London, CONTRACT for supplying any quantity of COAL and CANNEL.
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Presented by Her Majesty's Government to the French Government;
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Warranted to Measure correctly, and not to vary.
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GAS HYDRAULIC MAINS.

SAVES COAL, RETORTS, FUEL, LABOUR, TIME, SPACE, AND CAPITAL.

PREVENTS STOPPAGE OF ASCENSION-PIPES, DEPOSITION OF CARBON IN RETORTS.

GIVES MORE GAS, WITH HIGHER ILLUMINATING POWER, SATISFACTION, AND PROFIT TO SHAREHOLDERS AND MANAGERS.

IS STRONG, SIMPLE, EASILY FIXED AND WORKED, AND THOROUGHLY EFFICIENT AT ALL TIMES.

TESTIMONIAL.

Alton Gas and Coke Company, Alton, Hants, April 25, 1874.

GENTLEMEN,—In reply to your inquiry respecting your Patent Dip for Hydraulic Gas-Mains in use at these works, I beg to say that, upon looking into our carbonizing account for the last 12 weeks, and comparing the result with the same quarters of the past five years, I find that your Dip has given our Company an increase of 1286 feet of gas per ton of coals beyond the makes in the other years, notwithstanding the retorts have been in use for three years.

I may say that our Company are so satisfied with the Dips that it is intended to fit up the other retorts with them this summer.

I am, gentlemen, your obedient servant,

Messrs. Caffall, Thomas, and Co., Limited, 28, Gracechurch Street, E.C. WM. TEMMING, Secretary.

Models may be seen, and information obtained, at the Offices, 28, Gracechurch Street.

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SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

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FOR GAS, STEAM, AND WATER;

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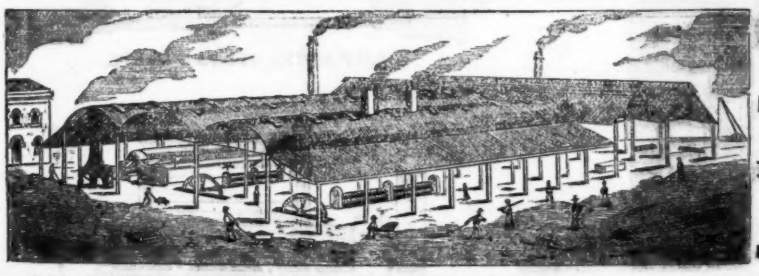

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WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

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Drawings and Prices upon application.

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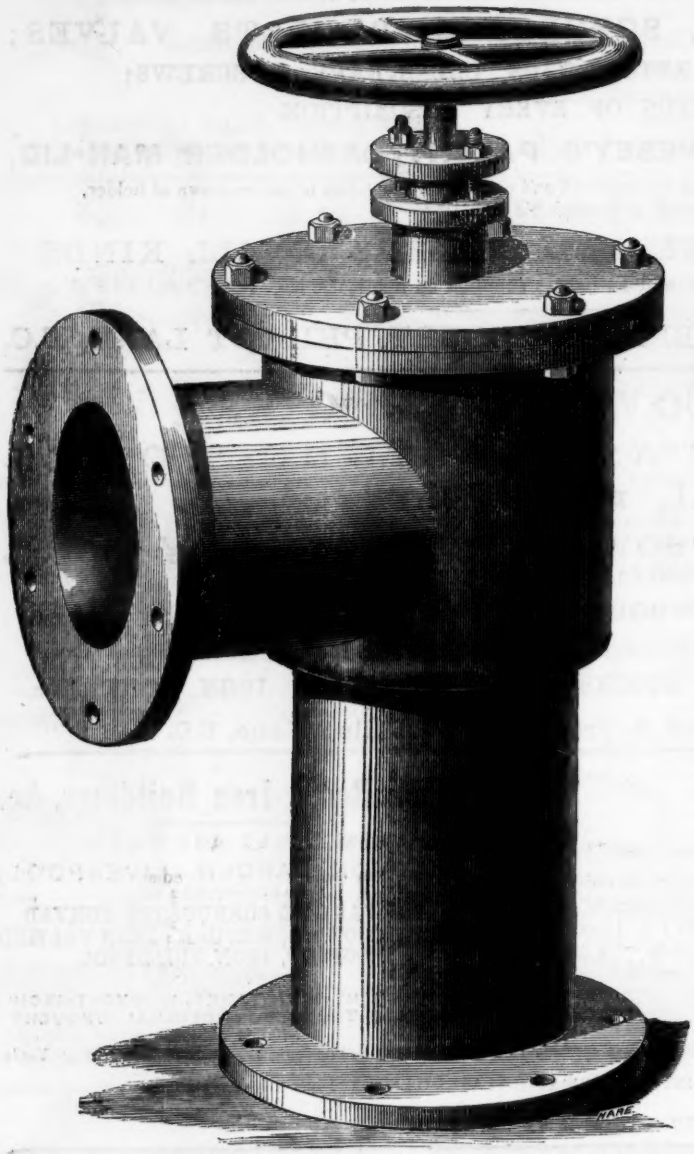
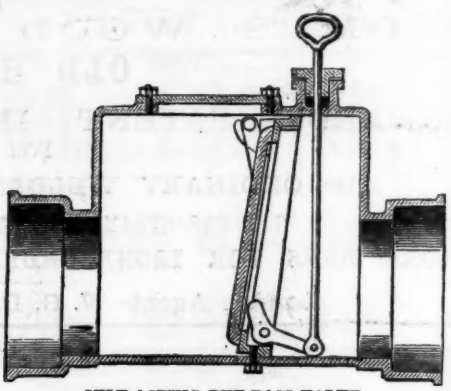
BEALE'S IMPROVED PATENT GAS-EXHAUSTERS,

COMBINED ENGINES AND EXHAUSTERS.

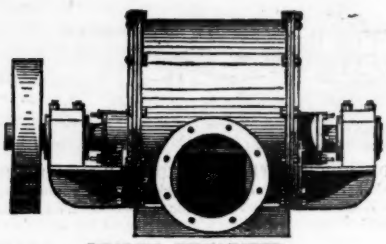


DISC GAS-VALVE.

These Valves have been specially designed by G. Waller and Co. for Beale's Exhausters. They are most effective in action, and have given universal satisfaction. They can also be made with spigot at base, to suit ordinary socket connections.



SELF-ACTING BYE-PASS VALVE.



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PUMPS, VALVES (2 in. to 30 in.), HYDRAULIC REGULATORS, ENGINES, &c., in STOCK.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,

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JAMES GREGORY AND SONS,

MANUFACTURERS OF EVERY DESCRIPTION OF

Corporate Mark
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Granted 1763.

STEEL TOOLS FOR GAS & WATER WORKS.

All-Steel Charging and Stoking Shovels, Coke Screens and Forks, Steel Scoops, Picks, Mattocks, Axes, Trowels, &c.

WELDING STEEL RAKE AND SPUD HEADS.

SUPERIOR CAST-STEEL FILES and SAWS; Solid Cast-Steel Hand and Sledge Hammers.
BEST CAST STEEL for making Chisels, Turning Tools, Taps and Dies, Drills, Snaps, &c.
SINGLE AND DOUBLE SHEAR, Spring, Sheet, and Blister Steel.
SILVER STEEL for Rod-Chisels and Diamond-Points for Cutting Cast-Iron Pipes, and for other work requiring a Special Quality and Temper, and every other description of Steel and Tools as supplied to the largest London Gas Companies, Contractors, and Engineers.

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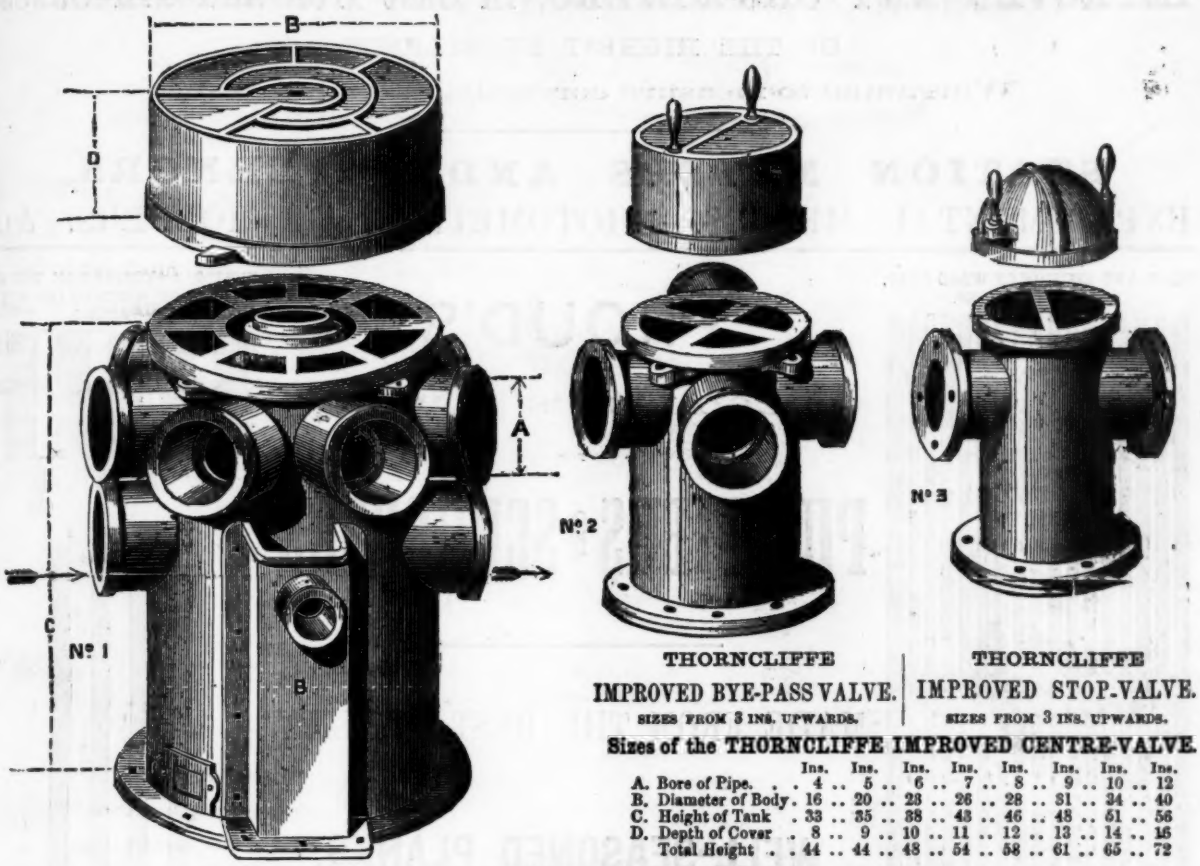
MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

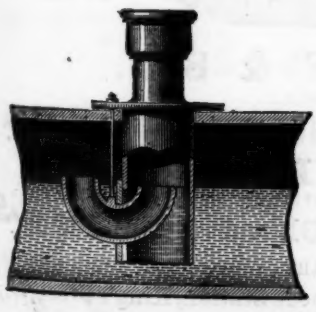
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

For Prices, &c., apply to

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THORNCLIFFE IRON-WORKS, near SHEFFIELD.

ALDER AND MACKAY,

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MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast Iron and Tin Cases,

OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

STATION METERS AND GOVERNORS,

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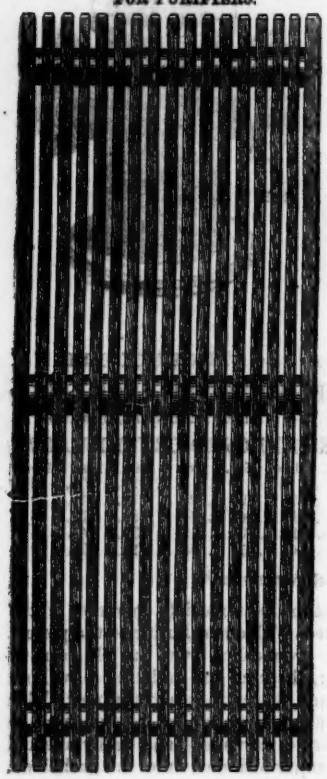
PLAN AND SECTION OF WOOD GRID, FOR PURIFIERS.



MADE EITHER TAPER or PARALLEL
WITH SQUARE OR ROUND DISTANCE BLOCKS.

PROUD'S

SPECIALITIES in WOOD

FOR

PURIFIERS AND SCRUBBERS

MADE FROM THE BEST QUALITY

OF

WELL-SEASONED PLANKS.

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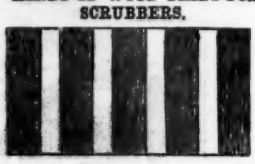
VERTICAL SECTIONS OF THREE KINDS OF WOOD GRIDS FOR SCRUBBERS.



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WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

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Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

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Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

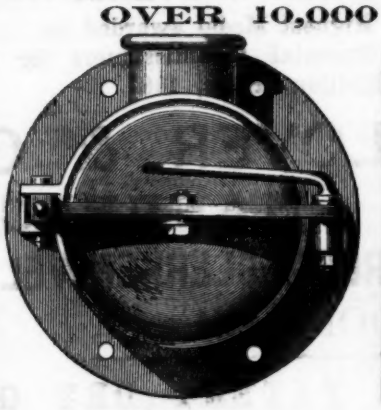
HOLMAN'S PATENT ECCENTRIC FASTENINGS & ANTI-FRICTION CATCHES.

OVER 10,000 IN USE.

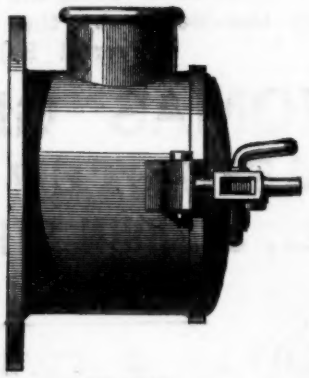
NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW.



SIDE VIEW.

SIMPLE.

ECONOMICAL.

DURABLE.

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

These Lids are Adopted by the following (among many other) Gas Companies:—

The Gaslight Company, Beckton (where over 2000 are in use).	The West Ham Gas Company.	The Salford Corporation Gas-Works.	The Carmarthen Gas-Works.
" Gaslight Company, Bow Common.	" Imperial Gaslight Company.	" Rochdale Corporation Gas-Works.	" Merthyr Tydf. Gas-Works.
" London Gaslight Company.	" Gas-Works, Arsenal, Woolwich.	" Liverpool United Gas-Works.	" Ystrad Gas-Works.
" Independent Gaslight Company.	" Commercial Gas Company.	" Birkenhead Gas-Works.	" St. Alban's Gas-Works.
" Phœnix Gaslight Company.	" Alliance and Dublin Gas-Works.	" Birmingham Gas-Works.	" Over Darwen Gas-Works.
" South Metropolitan Gaslight Co.	" Edinburgh Gas-Works.	" Nottingham Gas-Works.	" Aylesbury Gas-Works.
	" Manchester Corporatn. Gas-Works.	" Newcastle-on-Tyne Gas-Works.	" Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

"*The Gaslight and Coke Company (commonly called the Chartered Gas Company), Beckton, North Woolwich, July* 2, 1874.

"Messrs. Tangye Brothers and Holman,

"Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them. I should be very sorry to return to the old system of luting, and our stokers here freely acknowledge the benefit to them of the new system.

"I am, yours truly,

(Signed) "G. C. TREWBY.

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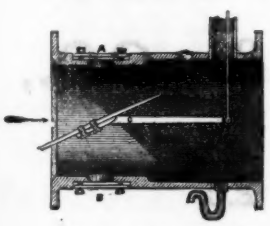

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

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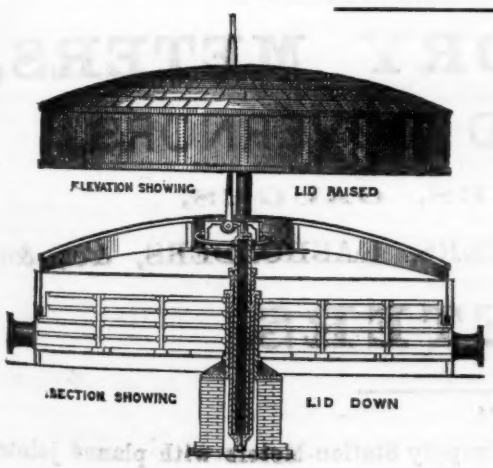

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, AUGUST 11, 1874.

Circular to Gas Companies.

By this time, we have no doubt, the Metropolitan Board of Works are fully convinced that they have made a great mistake. The announcement of their intention to apply to Parliament for power to start competing gas-works has evidently fallen flat on the ears of the metropolitan public. The daily press, for the most part, leaves the scheme unnoticed; the general public who think about the matter see in it only a probable addition to the Metropolitan Consolidated Rate. Beyond this, there is, perhaps, in most minds, a well-founded doubt, which we share, as to the sincerity and earnestness of the Board. Otherwise, how could it happen that a scheme, the most important ever entertained by the Board, involving, if effectively carried out, an expenditure of eight millions—which would be as completely lost for profitable purposes as the money spent on the Thames Embankment—should be passed over almost without notice? It seems clear to us that the public have no confidence in the intentions of the Board. The *Standard*, representing, we have no doubt, Conservative opinion fairly enough, candidly recommends the Board to drop the scheme at once; believing, as we do, that no greater misfortune could befall them than to carry their proposed Bill. The *Pall Mall Gazette*, which has discovered, what certainly no one of the companies has found out—viz., that in 1873 "a "higher degree of financial prosperity was reached by the "metropolitan gas companies than they had ever attained previously"—and which is accordingly envious and unfriendly, still tells the Metropolitan Board that they are not to be trusted with the gas supply. "The conduct of a great manufacture of gas "in the public interest," they say, "can only be entrusted to a "body in which the community reposes a well-grounded "confidence, and over which it exercises a stringent and "direct control." If this opinion be common, and we know that it is shared by many, the Board may imperil their own existence, by their proceedings against the gas companies. It is useless, however, to speculate on contingencies of this sort. We know that, as regards the gas supply of the metropolis, Parliament will sanction but one proceeding on the part of the Board, and that is the purchase of the companies. Whether that would be approved or not depends, of course, upon the action taken by the ratepayers of the metropolis; and we rather think, after all, they would oppose the pretensions of the board. They would probably decide to bear the ills they have—complain of, at least—than fly to others that they know not of.

It may be taken as certain that some legislation with respect to gas matters will take place in the next session of Parliament, even if the Metropolitan Board retreat from the position they have taken up. We learn without astonishment that the Imperial Company may probably find it necessary to make an application for additional capital. The accounts of another company also seem to show that further capital will soon be required. In either or both cases the Metropolitan Board would, of course, appear in opposition, and raise the whole question. We shall have another long inquiry, the result of which may be safely predicted.

No question has been so thoroughly sifted as this of the metropolitan gas supply. Committee after committee have sat upon it, and the result, we are told, has always been legislation "hostile to the interests of the consumer." The statement is deliberately made that Parliament is corrupt—that committees are over-awed by the joint-stock interest, and manipulated by those in power. The allegation is unjust and untrue. Parliament, we may admit, is mindful of the interests of traders, but shows no indisposition to protect purchasers. There is, in fact, a good deal of legislation hostile to the interests of traders. That some gas companies should be practically guaranteed their maximum dividends may or may not be just, but the right has been solemnly conceded, and cannot now be taken away.

We have, unfortunately, to read a good deal about the antagonism existing between gas companies and their customers. Such a feeling may exist, but not on the part of the companies. It is altogether a misrepresentation to say that gas companies delight in high prices. There is not one in the metropolis which would not gladly supply at a lower price than the South Metropolitan if it were possible. High prices are forced on us by a stern necessity, and yet gas is even now cheaper in the metropolis than it was 20 years ago, notwithstanding all the alleged misdoings of the companies. Cheap gas may yet be had, but, along with it, may come less capacity for paying for it. The late high price of coal was the consequence of an unexampled condition of prosperity. The trading community and the wage-receiving class in general were never before so well off. Some suffered, no doubt, but the general state of prosperity was unparalleled. As trade revives coal will probably become dearer. There may be further and continued depression, and with it low wages and short employment. Which of the two is the more desirable we leave our readers to decide.

In his speech at the meeting of the Imperial Company, the governor, Mr. Richards, candidly pointed out to the Metropolitan Board the opposition they will have to contend against. Parliament has never permitted a municipal authority to trade upon the public rates in competition with a statutory company. The thing has been tried over and over again with the same result, and no other is to be expected from the present Parliament. We cannot help thinking, therefore, that the Board would exercise a wise discretion if they took the advice of our contemporary, quoted above, and withdrew from the false position they have taken up. Bad luck has attended their efforts at legislation this year; and further defeats may cost them what prestige they possess.

With commendable promptitude, Mr. Field has again issued his analysis of the accounts of the metropolitan gas companies for 1873. A glance over these tables would soon convince our contemporary, the *Pall Mall Gazette*, that the gas companies did not last year reach a higher degree of prosperity than they ever before attained. The test of exceptional prosperity would be seen in additions to reserve or contingency funds, and we see

that only three companies made such additions last year, and those only to a very small extent. On the other hand, some of the companies were obliged to make large draws on these funds for the payment of dividend, and have been compelled to do so again this year. We notice that Mr. Field estimates, as we did, a considerably increased sale of gas per ton of coal. His average for 1872 was 8245 feet, and, for 1873, 8444 feet. This marks a decided improvement. There is one table in these accounts which deserves the attention of managers. Mr. Field calculates the per centage of coke made, used as fuel, and the differences are striking. The Phœnix Company, for example, use but 19 per cent. of the coke they make, while the Independent consumes 37 per cent., the average of all the companies being 29 per cent. The column of total working expenses, when compared with the same table in last year's accounts, shows wide differences, not observed before. The total working expenses per ton of coal to the South Metropolitan Company amounted to 11s. 1d., and in the case of the Ratcliff to 16s. 1d. With the single exception of the former company, the accounts of all show an increase in the working expenses, ranging from 2s. to 5s. per ton of coal carbonized.

Our readers will thank Mr. G. Anderson for removing their doubts as to the amount of sulphur in his gas. The results given are a testimony to the efficacy of washing and scrubbing in removing sulphur compounds. We have said before that very little sulphuretted hydrogen could reach Mr. Anderson's lime purifiers, and now it is clear that most of the bisulphide is stopped in the washer, more probably than in the scrubber. Does not Mr. Anderson incur some responsibility in so carefully removing a compound, which, on combustion, is converted into such a valuable health-preserving and curative agent? He probably cannot help it; we are all of us, at times, compelled to make concessions to popular ignorance.

The Corporation of Nottingham are naturally rejoicing over the settled purchase of the gas company. They have, indeed, made one of the best bargains ever made in purchases of this kind. The consideration for the purchase of the undertaking is as follows:—"In respect of every fully paid-up share (of £50) in the "capital of the company at the date of the transfer, as from and "after the 8th day of May, 1874, for a period of seven years, "an annuity of £3 2s. 6d., payable by equal half-yearly pay-"ments on the 8th day of November and the 8th day of May "in every year, without deduction, except in respect of income-"tax, the first half-yearly payment to be made on the 8th day of "November, 1874. From and after the expiration of that period "of seven years, a perpetual annuity of £3 5s., payable by equal "half-yearly payments on the 8th day of November and the 8th "day of May in every year, without deduction, except in respect "of income-tax, the first half-yearly payment thereof to be made "on the 8th day of November, 1881." Since the works are some of the best appointed in the kingdom, and a large extension of business may be anticipated, the Town Council have reason to rejoice, nor have the shareholders reason to grumble.

Water and Sanitary Notes.

THE grand scheme for the supply of water to Edinburgh, which the trustees have this year obtained power to carry out, is exceedingly well described in the *Scotsman* newspaper, but we can afford no space for the description to-day. It will constitute, when the works are completed, one of the most remarkable undertakings in the kingdom, and we are certain will reflect the highest credit on the engineers who selected the gathering-ground and designed the works, and also on the trustees, who, in the face of much factious and, we fear, interested opposition, have, at last, succeeded in carrying the scheme. Edinburgh may now be considered to have a supply of water for all time, for no rapid growth of the city is to be expected, and the supply is, practically, unlimited, unless we are visited with droughts never before experienced.

The rising town of Kirkintilloch was one day last week *en fête*, on the occasion of the opening of some new water-works for the supply of the district. The enterprise shown by a small Scotch town in providing an efficient water supply forms a wonderful contrast to the apathy displayed here in the south. Woodstock is not a lively place, and, moreover, from the census returns, it would appear to be a declining town, but it seems to be very badly off for water, and the vestry are anxious for a better supply. They have set their affections on a brook, which belongs, of course, to the Duke of Marlborough; but it is in a filthy condition, and requires cleansing, and the duke, also of course, refuses to contribute to the cost of cleaning it out, which would altogether amount to only £305. The Corporation will not do anything, and the duke will do nothing, and no encouragement is given to the formation of a private company. The rural sanitary authority is now to be applied to, and upon their action depends for the present the adequate supply of Woodstock with water.

The Town Councils of Salford and Manchester appear to be at loggerheads over the cleansing of the river Irwell. By some freak of legislation, or otherwise, the Corporation of Salford seem to have become the Conservators of the Irwell; but Manchester defiles the river as much, if not more, than Salford, and the latter Corporation fancied they could persuade that of Manchester to assist them in preventing the pollution. They were mistaken. We cannot say they were laughed at; but it is reported that Sir Joseph Heron recommended Manchester to keep clear of the business. The absence of united action in the case of Corporations, circumstanced as Salford and Manchester, is greatly to be deplored, and fully justifies the belief forced upon us that the time is coming when some central authority must step in and do the work which local jealousies obstruct.

The Town Council of Preston have excellent water-works, but they seem to cost a great deal of money. We are not certain how much has been spent on them up to this time, but in 1871 the council borrowed £50,000, and now, in 1874, they require £40,000 more for the completion of works still in progress. We are very much afraid that the water-works at Preston are not profitable to the Corporation.

The public analysts of England, alarmed at the report of the last Adulteration Committee, have met in conclave, and have agreed to a series of resolutions, which are here appended:—

1. That the meeting should take the report of the select committee of the House of Commons on the Adulteration Act into consideration, and suggest amendments in the present Act, with a view to legislation next session.
2. That the reference of disputed cases to Somerset House Laboratory, or to any other body, could not for a moment be entertained.
3. That any compulsory examination of a public analyst would be most objectionable.
4. That the report of the committee does not state what does or what does not constitute adulteration.
5. That "facing of tea" is an act of adulteration, and that, if such tea is to be allowed, any future Act of Parliament should specify the per centage of facing to be allowed.
6. That mixtures, besides being labelled, should also bear a statement of the per centage of the ingredients used.
7. That the proposal to leave a portion of the sample with the vendor is objectionable.
8. That the analyst occupies an independent position between the trader and the consumer, and has no interest in instituting proceedings at law.

Now, as regards the third of these resolutions, we can only say that it is a matter of notoriety that a number of men have been appointed as analysts, who were and are entirely ignorant of chemistry and the art of analysis. They have, however, obtained certificates of competency, and their appointments have been sanctioned. Some of them, believing that analytical chemistry is to be acquired as easily as milliners girls acquire a ladylike handwriting—viz., by the receipt of six lessons—have resorted to laboratories (after their appointment, be it observed) for instruction, while others have taken second and third-rate assistants to do their work. Then, as regards the seventh resolution, we have no hesitation in expressing an opinion that a trader is as much to be relied upon as an analyst, and would insist that a sample, sealed, should be left with the former. Let us take an example. An analyst receives a sample of bread in which he professes to find alum. The baker sends a sample to another analyst, who does not find alum. An arbiter is appointed, and the official analyst sends his sample to the arbiter. Is there anything to prevent the analyst from adding a solution of alum to the bread before it is sent to the arbiter? No. What is sauce for the goose is sauce for the gander, and we strongly recommend that a duplicate sample, sealed up, be deposited, if not with the vendor, with the clerk of the peace or the vestry-clerk, as may be. We must confess our astonishment at seeing a body of reputedly scientific men displaying so much weakness. Such a thing has never before happened with any body of men so circumstanced.

The committee of the Corporation of Nottingham, who undertook to purchase the undertaking of the water company, have dissvolved themselves. The last terms they offered were 6½ per cent. annuities, which were refused by the directors, and Parliament passed the Bill, enabling the company to raise additional capital to carry on and extend the undertaking.

METROPOLITAN BUILDINGS AND MANAGEMENT ACT.—It was stated at the last meeting of the Metropolitan Board that the fees to counsel engaged on this abandoned bill amounted to £1794, and that the total amount of counsel's fees during three months of the last session was no less than £3103. Mr. H. L. Taylor complained that the board had been extremely extravagant in the fees paid to professional men, such as architects, accountants, and barristers. The officials in the solicitor's department had been extravagant in marking briefs, and professional men had been encouraged in making charges.

KNARESBOROUGH GAS SUPPLY.—At the meeting of the Improvement Commissioners, on the 3rd inst., the minutes of the meeting of the Gas Committee, held on the 27th of July, were read, recommending a contract to be entered into for supplying Brancepeth gas coal and cannel at a considerable reduction upon last year's prices; also that the price of gas consumed from and after the 5th of last month be reduced from 5s. 10d. to 5s. per 1000 feet, being the same price that was charged before the advance in the price of coal; and that the time of commencing to light the street-lamps be on Saturday, the 29th of August. The minutes were confirmed.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

XXV.

On Setting Retorts.

Of all the operations connected with the manufacture of gas, the process of carbonization is by far the most important. On this mainly depends the success of the undertaking, and strict economy in that operation can only be obtained by the proper selection and setting of retorts. In describing this part of our subject, certain general principles may be laid down, any deviation from which must be prejudicial to satisfactory results.

1. The heat necessary for the decomposition of the coal should be obtained in the most economical manner, the fuel in the furnaces (when this is coke) being always maintained at a bright heat approaching whiteness, for as the caloric when generated is dispersed throughout the oven, and a portion of it is continually being carried off by the gas issuing from the coal, the temperature in the retorts will necessarily be considerably lower than the fuel in the furnace. A large quantity of fuel may be employed in combustion, without intensity of heat being secured, which is of no practical use. A multitude of ordinary house fires would be insufficient to heat a single setting of retorts, inasmuch as the requisite high temperature for the distillation of coal could not be thus attained.

2. The heat as generated, should be transmitted to the oven and retorts as readily as possible; the passages for its conveyance should be sufficiently large to permit it to pass with all freedom, otherwise although the furnace and its vicinity may acquire the desired temperature, the retorts may be quite unsuitable for successful carbonization.

3. The nostrils and flues should be distributed in such a manner that the retorts in an oven shall be, so far as practicable, at a uniform temperature throughout their lengths and the whole setting, but as the radiation is always greater at the mouthpiece than any other part, of necessity, at that point, the temperature will be diminished. Further, the caloric should be retained within the oven, by causing it to make a circuitous passage before passing to the flue. By the careful adjustment of the damper, which, to ensure rigid economy, should be always under the control of the workman, any material loss of heat at this point will be prevented, for whenever the current of air is excessive, a considerable waste of fuel is the consequence.

4. In the construction of retort-settings all superfluous non-conducting material within the oven should be avoided, for it is evident that any impediment to the free passage of the heat to the coal undergoing distillation, must of necessity increase the fuel account. Settings have come under our notice in which, from this error and an excess of flues, the retorts nearest the furnace, which should have been the hottest, have hardly been suitable for carbonizing.

5. Having constructed the settings so as to obtain the heat economically, having distributed it in a proper manner, and adopted the necessary precautions, as far as practicable, to prevent it passing uselessly to the chimney, it becomes indispensable to prevent undue loss by radiation, for all waste from this cause is equivalent to permitting the money value of the fuel, requisite to produce the lost heat, to pass insensibly away. For the prevention of radiation, the retort-house should not be too open, the walls forming the backs of settings when single, and those at the ends, should always be of good thickness, not less than 2 feet 6 inches, including the fire-bricks facings, and the thicker the better. The arches in like manner should be protected by a thickness of at least 18 inches of common brickwork on the top of the crown, and levelled throughout the length of the stack of settings. The lateral and main flues should also be enclosed at their tops and sides to a thickness of 14 inches, and the front wall of settings should never be less than that. With attention to this point, stopped ascension-pipes would be of rare occurrence. Sight-boxes, when used with clay retorts, are simply needed to observe their temperature, and any excess of these should be avoided. Two of them, for a bed of five or seven retorts, are all that are required, and if of 2½ inches or 3 inches diameter, will be sufficient, their plugs being filled with fire-clay. Lastly, all beds, when out of action, whether old or new, when in the vicinity of other retorts in operation, should be bricked up, the retorts having a 9-inch wall within their mouths, the furnace-door and ash-pan closed in like manner, and the dampers of all settings not in use securely closed.

To show the importance of these observations regarding radiation, we may mention that on two occasions, at distant periods, and at different places abroad, we were compelled, in order to meet our engagements, to commence heating the retorts before the building was covered, the sheets for that purpose not having arrived. In the first case, it being summer time, no difficulty arose; but in the second case, which occurred in a warm climate in the month of October, it was found that during the daytime the retorts heated tolerably well, and in such a manner as to lead to the belief that at the end of 48 hours they would be fit for charging; but, during the early hours of the morning, the heat gained during the preceding day was lost. After several days of ineffectual labour, finding the retorts did not attain the desired temperature, the roof was partly covered with canvas, and then all went well. Between the extreme temperatures there was probably not more than 20° Fahr., but that slight variation rendered success impossible. This effect was entirely due to the loss of heat by radiation—a subject which hitherto has received but little attention.

Another extraordinary instance came under our notice some years ago, when iron retorts were used. We were consulted respecting the operations of a small works of about 15 million feet per annum, and on investigation we found everything connected therewith was in the greatest disorder, but more particularly the settings of retorts, the arches and front walls of which were only 4½ inches thick, whilst the only means of preventing radiation from the tops of the arches was a quantity of sand reaching to about 6 inches above the crown, the same material filling in the spaces between them. This sand was so excessively hot that a piece of wood, when placed therein, was speedily charred; and, as may be imagined, the retort-house was the hottest we ever went into. Newcastle coal was exclusively used, yet the fuel required for carbonizing was not less than 80 per cent. of the coke produced, a large portion of heat being lost by the excessive radiation. This wretched state of affairs was remedied by reconstructing the beds, making the tops of the arches and the front and back walls of suitable thickness, when the fuel account was reduced to less than half of the former amount; and, as coke in that locality was a valuable commodity, the saving so effected contributed towards the payment of a respectable dividend. Absurdities quite equal to this are to be met with in some small works even at the present day, as no doubt many of our readers are aware.

Having suggested these principles to be observed in the construction of retort-settings, we would now enter into general detail on the subject, it being understood that our observations are intended for the instruction of managers of works of limited capacity. Little, therefore, will be said concerning large establishments, which do not come within the province of this part of our treatise.

In gas-works of the largest magnitude, the beds of retorts are constructed on arches, of equal width and depth to the ovens. This system, as we have shown, originated in the earliest days of gas lighting, and then, as now, these arches, known as the coke vaults, served as stores for the coke until carted away or stacked. The coke, as drawn from the retort, falls on to the floor below, where the "spreader" extinguishes it, and it is ready for removal. Engineers are divided in opinion respecting the utility of the coke vault. By some it is contended that the coke, in falling from a great height, is broken, and necessarily diminished in value; but, on the other side, the strongest of all arguments in its favour is the fact, that no work, as far as we are aware, where the coke vault has been in use, has ever renounced it, and that, after upwards of 50 years experience by the engineers of the Chartered and Imperial Companies, the coke vault is adopted in the new and extensive works lately erected by those large companies.

It must, moreover, be admitted that the coke vault dispenses with a considerable amount of painful labour, in barrowing and discharging the red-hot coke; it saves the men from being exposed to the great heat attending this operation; and it is a question of great doubt with us whether the coke made in works having no vault is in reality larger. If not, the argument employed against it is untenable; but we may observe that under no circumstances can the coke vault be applied with advantage in very small works, nor have we ever seen it in any modern medium-sized works having a consumption of 100 million feet per annum. There are also extensive establishments where the coke vault is unknown; but, in some of these, this has arisen from the fact of the works having been commenced on a very small scale, and, being extended gradually from time to time, the system first adopted has not been deviated from.

We now proceed to our observations on small and medium-sized works generally, some of which may be equally applicable to the largest establishments. The foundations of retort-beds require not only to be solid, in order to prevent settlement, but also to be constructed so as to prevent any undue loss of heat by transmission at these points. Their footings should extend somewhat beyond the actual position of the beds, a system observed in the construction of ordinary walls, piers, &c. Where the soil is clayey or of a hard nature, a depth of 2 feet or 2 feet 6 inches from the intended flooring of the retort-house will be sufficient for the purpose, the foundation being executed with common bricks. Should the site be sandy or gravelly, a somewhat greater depth will be necessary, and if it is in a humid locality, additional precautions are then indispensable. In these cases the foundation should be made of a depth of 5 or 6 feet, and puddled at the bottom and sides. Some engineers place inverted arches in their formation, but as these offer no advantage over solid brickwork, we do not recommend them.

The foundation being constructed within six inches of the level of the intended flooring of the retort-house, the footings of the piers of the ovens (as well as the back wall, when single retorts are used) and the end walls are then built, and on these are commenced the piers of the oven arches, which, in very small works having settings of three retorts and under, are only 9 inches thick, but in larger works they are carried up 14 inches thick, with fire-bricks to the height of the spring of the arches. The end walls and the back wall should be carried up to the same height, all the parts within the ovens being built with fire-bricks to the thickness of 9 inches, and the rest with common bricks.

In small settings of three retorts and under, the arches of the oven are constructed 4½ inches thick, care being taken to fill in between them with fire-bricks to that height, so that not less than 14 inches of that material will exist between the arches, which rule should be observed in all settings. We knew an instance in which, a 14-inch wall being the pier of two arches, having only fire-bricks at the two sides, and filled in with common bricks, the latter melted when in operation, and the arches of the settings came down. Where the fire exists only on the one side of an arch or wall 4½ inches thick, common clay will be baked on the other, but will be far from approaching fusibility unless in close proximity to the

furnace, or along the lower parts of settings, at which points refractory material should be employed to a depth of at least 1 foot, and, in close proximity to the furnace, even a greater depth of fire-brick will be necessary.

In settings of five or more retorts, the arches are built nine inches thick, in two courses, and the lateral flues, as well as the main flue, when placed on the beds, should be commenced on the crowns of the arches. The lateral flue, leading directly into the main flue, is provided with a proper fire-tile damper made for the purpose, to which the brickwork should be nicely adjusted, serving as it does as a valve to control the passage of the air. The damper should either be suspended by a chain passing over a pulley with a counterbalance weight, or other means should be adopted to control its action, it being essential to arrange it in such a manner so as to be able at all times to know exactly the extent it is open.

The main flue is sometimes, although rarely, in the centre of the bed between the mouthpieces, on a level with the floor of the retort-house. This system is not advisable, particularly in small works, as it is difficult of clearing when obstructed. In other instances vertical flues exist at the end of the single settings, or at the middle of the retorts in double settings, which will be hereafter described.

Ordinary fire-bricks are 9 inches long, 4½ inches broad, and 2½ inches thick, their average weight per 1000 being about 3½ tons. The half or split bricks vary from ¾ to 1¼ inch thick, and are used for levelling the courses. Soap bricks are made 9 × 2½ × 2 inches, for the purpose of breaking joint when laying "headers." Arch bricks are made of the same length as the others to suit any curvature, and when ordering them, it is necessary to give the thickness of the two sides.

Manufacturers of fire-clay goods now offer the greatest facilities to engineers in supplying all the various pieces—as blocks, tiles, piers, dampers—required in setting retorts. Fire-tiles and slabs for guards or flue covers are kept in stock of all dimensions at most establishments, up to 20 inches square and 3 inches thick.

For the interior of the furnace in immediate contact with the fuel, the very best bricks that can be procured should be employed, for this is unquestionably the weakest part in a retort-setting; and, if bricks could be produced capable of resisting the heat and the fusible action of the fuel, they would be invaluable. We believe, for this purpose, the best at present known are those manufactured in Stourbridge, and the Welsh Dinas bricks. But a superior kind, for resisting heat, are made at "Nonsuch," near Ewell, and are called "Nonsuch" bricks; but, unfortunately, they are very soft, and, in consequence, easily injured by the workmen when "clinkering." For the courses beyond the action of the clinkering-bar, as well as the arches or slabs for protecting the retorts, the "Nonsuch" bricks can, however, be strongly recommended.

For that part of the furnaces in immediate contact with the fuel, we have employed lumps of 6 inches thick, 10 or 12 inches long, and 9 inches wide, which have answered well, on account of the absence of joints at the parts where the ordinary bricks speedily yield, and so are gradually destroyed.

The old system of constructing furnaces with several fire-bars, large furnace area, and using thin layers of fuel, although very suitable where coal is employed, is by no means adapted for burning coke. For this purpose the fire-place should be of small area and of great depth, so that during combustion the uninflammable gas (carbonic acid), formed at the lower part of the stratum, is in its passage through the fuel converted into a combustible gas (carbonic oxide), which not only avoids the negative action of the former, but assists materially in the production of caloric. Moreover, by this form of furnace, a comparatively small quantity of air passes through a thick stratum of fuel, thus producing the desired intensity of heat.

Furnaces constructed as described have been proved by experience to be by far the most economical for burning coke, whether for gas manufacture or other purposes in which great heat is required, and they are universally adopted. Coke, as fuel, is employed to the best advantage, when subjected to the direct action of the passing air. The formation, therefore, of any ledge or place within the furnace, where the coke could be placed beyond that influence should be avoided. It is by no means uncommon for such a ledge to be built at the back of the furnace, and, as we have had occasion to show, fuel placed in such a position does not produce the best effect. In laying fire-bricks (as indeed all others, when very superior workmanship is desired), they should be well wetted, the fire-clay mixed almost in a semi-fluid state, used sparingly, and the bricks rubbed into their seats, so as at the same time to fill the end joints. All the intervening spaces should be well filled in, and the joints of the courses made as thin as possible.

The furnace-bars and bearers are generally of 1¾-inch to 2-inches square iron, but in some works round bars are used of the same diameter. The bearers are built into the brickwork in such a manner as to leave a space of 5 or 6 inches at each end of the furnace-bar, otherwise they would speedily be burnt away at those points. The bars are moveable on their bearers, in order to facilitate the clinkering. By some engineers they are made to extend to the door-frame, whilst others place an arch or its equivalent over the front part of the ash-pan, with brickwork between the door-frame and the front of the furnace, as hereafter shown.

The ash-pan, in addition to the office its name implies, serves other most important purposes, for, being filled with water, which, when convenient, should always be supplied hot, the steam arising therefrom tends to cool the furnace-bars, and thus materially aid in preserving them. As the steam passes through the fuel it is decomposed and resolved into two gases—hydrogen and oxygen—the former a fuel, and the latter the source of combustion and heat.

The flame produced by the decomposition of water may be often observed in the operation of clinkering or clearing out the furnace. When the incandescent coke drops into the water beneath, steam is rapidly evolved, which, passing through the fuel, is converted into inflammable gas, producing an immense flame, which sometimes issues at the door of the furnace, from which the workman is obliged to retreat. The ash-pan should be of wrought iron; those of cast metal often crack, allow the water to leak, and cause considerable trouble.

The furnace-door frame should always be extended to the floor, wherein it is built; the hinge and frame of the door should be at a slight angle, so that the door will remain closed without the intervention of the troublesome and useless latch.

Should the hinges and door not be made inclined as indicated, the desired object will be attained by setting the frame at a slight angle. For this purpose its base is brought out a short distance—about 3 inches—from the wall, care being taken to fill in the space between the framing and wall so that air may not enter at that point. The simplest means of securing the door-frame is by bolts about a foot long, with nuts, the bolts being elbowed at an acute angle, close to the screw, and their claws or ends built in a part of the brickwork beyond the destructive action of the heat.

The mouthpieces of retorts should be provided with wrought-iron lids, which are much lighter than those of cast iron, and thus relieve the men from a part of their hardest work. These lids are about a quarter of an inch thick, and to give strength to them they are hollowed or dished, having a simple lug on each side, so that they can be *dropped* into their place. These lugs should be long enough to enable the workman to take hold of them easily with his gloved hand, or while employing any other means to protect himself from the heat.

We see, in this simple part of gas apparatus, how slow we are to deviate from the beaten track, for at the present day retort-lids are made with the two eyes, precisely as adopted by Malam nearly 60 years ago; and it is often painful to witness a stoker, exposed to the heat of an immense flame, endeavouring to get a lid of this kind into its position, when, without the lower part of the eye, it could be easily dropped into its seat. But when we consider the time required to understand the utility of the damper, and remember that it was only after 50 years experience the ladder for lighting and extinguishing the public lights was dispensed with, we need not be much surprised.

Another old-fashioned method still retained in a few works is that of cementing the socket for the ascension-pipe, by means of a flange, on to the mouthpiece, instead of casting the socket therewith. That this system has been adhered to is more surprising than the defect already mentioned, inasmuch as the joint is always difficult to make, is frequently unsound, is expensive, and, to say the least, is a "bad job."

The socket of the ascension-pipe should always be cast with the mouthpiece, and of such diameter as to leave plenty of room for the joint. It has been supposed that by placing a short neck between the two, the choking of the ascension-pipe would be prevented, to which opinion, however, we do not conform. We believe the best method is to cast the socket directly on to the mouthpiece, leaving the necessary projection inside to prevent the cement dropping through.

Respecting the ascension-pipes, beyond the difference in their first cost, nothing can be lost by making them large enough. In all new works they should be of six inches internal diameter, tapering to four inches, the usual size of the bridge and dip-pipes, and this we have always found large enough. When cementing the ascension-pipe into the socket of the mouthpiece, a small portion of fire-clay should be intermixed with the cement. The joint will in no way be deteriorated thereby, and when desirable it can be taken asunder with greater facility than if made with cement alone. In some instances we have observed, through the excess of sal ammoniac intermixed with the iron borings forming the cement, that sockets have been split in such a manner as to render them useless, a circumstance occasioned by the expansion of the cement in setting. In all pipe-joints for gas we recommend, therefore, the admixture of a small portion of fire-clay with the cement, which will prevent this casualty.

The bridge or H or N pipes are constructed of various forms, and so long as proper provision is made for clearing them when necessary, their shape is of no consequence. They are always attached to the ascension-pipes by means of flanges and bolts and nuts, the joint being either iron cemented, or made with hempen washers, dipped in a mixture of red and white lead, the other end generally having a spigot, which is connected to the dip-pipe with a lead joint.

The dip-pipe is fixed to the hydraulic main with a flange and bolts, and hempen or cardboard washers. The flange is so situated on the pipe that, when in position, its lower part will dip about 1 inch into the liquid in the hydraulic main, whilst the upper part is 2 feet or so from the flange, and is provided with a socket for receiving the bridge-pipe. The shorter the dip is the better; and if the hydraulic main could be secured always at a perfect level, then half an inch would be sufficient.

The stacks or beds of retorts are generally supported throughout their length and width by iron vertical staves, held together with tie-rods. The former, by preference, are of railway iron, having suitable holes for the rods, but usually they are of cast iron, 8 feet or 10 feet long, 1 inch or 1½ inch thick, and 6 inches or 8 inches wide, and are set edgeways, one of these being placed in front of the centre of each pier of the beds. Thus, in "through" retorts, they are opposite each other, a tie-rod, having a screw at both ends, passing from the one to the other, and, by means of

nuts, the backstays are tightened up, so as to secure the brickwork and prevent it bulging when the retorts are heated.

Although this system is very generally applied, from our own experience we must say, so far as regards the bracing together of the brickwork, from back to front, we do not think it practically of any value, for we have seen at times the tie-bars entirely burnt away at the centre, leaving a distance of several inches between the two parts which were supposed to be supporting the brickwork. Another difficulty which presents itself to their use is the expansion of iron by excessive heat, so that if screwed up very tight when cold, the tie-bars would expand when the retorts were heated, in such a manner as to be positively useless. These remarks apply only to the cross-tie and bars, which we do not consider advantageous, more particularly if the brickwork has had sufficient time to dry. As regards placing the backstaves at the ends of settings, with the tie-rods passing over the length of the beds, this is undoubtedly beneficial, for in this case the rods can be easily placed above the lateral flues, thus being exposed to the open air, and free from the excessive heat. Moreover, support in this respect is more necessary than in the opposite direction, as the arches, even when perfectly dry, are disposed to yield unless well sustained; but, in addition to this, it is necessary to place a good buttress at each end, which serves the double purpose of support, and prevents the radiation of heat from the beds adjoining them. But a space should always be left between the walls of the building and the buttresses, otherwise the former may probably be bulged out by the expansion of the stack of retorts.

(*To be continued.*)

Correspondence.

SOME MODERN APPLIANCES IN GAS-WORKS.

Sir,—Mr. Alexander, who read a paper at the meeting of the North British Association of Gas Managers, on "A Self-acting Seal," was good enough to say, "It may appear strange to speak of improving an appliance which the former part of this paper is meant to show may be done without, but what follows may be useful to some who are not as yet prepared to throw aside our time-honoured friend the hydraulic main." Well, a tried friend is better than a hundred untried ones, and I will venture to say that many of those "not as yet prepared" persons, who have been accustomed to look at our "old friend" in works where the dip-pipes can be counted by hundreds, would lose their breath at the idea of throwing aside this time-honoured friend, and substituting it by any of the inventions springing up so plentifully around us even by the dozen. But what say some of the Northmen? Mr. Robb says, "I have been a gas manager for 30 years, and have never heard of any of these difficulties," and in the early part of his remarks he says, "No doubt they are beautiful inventions, and quite sufficient for the purpose, but do we really want them?" Now I am rather inclined to think that anything so ingeniously contrived as to be called a beautiful invention (and, when compared with the grand old simplicity of the hydraulic main, that term may be used) is out of place on or near a range of retorts.

Mr. Whimster, some 14 years ago, followed this track, and is now in the same frame of mind, as regards the hydraulic main, that some, if not all, of the engineers of the present day will be in in less than that time, without something better than what we are now thinking of comes to their aid.

The remarks of Messrs. Macrae and Macpherson are well to the purpose, and should be carefully read by all who are wavering in respect to this matter.

The *saving claws* in Mr. Alexander's paper is a modification of the old dip-pipe, and is worth a consideration—I mean only as far as the side-holes are concerned. The added parts would not bear repeating by the hundred, and by this test must all inventions be judged that have any pretensions to improve the retort-power of a gas-work. All things that are only applicable by twos and threes in this respect are valuable in certain places, but must not be set up as the all-needful.

Mr. Boyd's invention is not in a condition to say much about, but one remark I must notice. He says, "It is now considered by gas engineers that the seal in the hydraulic main has more to do with generating carbon in the retorts and 'chokes' in the ascension-pipes than the back pressure of the purifiers and gasholders." I know engineers that will not admit this, they being in the same form of experience as Mr. Robb and others who took part in the discussion of the two papers referred to.

Aug. 6, 1874. Cui Bono?

ANDERSON'S GAS PURIFICATION.

Sir,—Doubtless, had I thought that there was any question about the purity of the gas purified as described in the paper I read to the Association of Gas Managers, it would have been well to have stated the amount of sulphur remaining in the gas.

I have in former years, when the same question has been discussed, stated that our testings gave from 12 to 16 grains per 100 feet of gas.

We are so satisfied on this point that for a year or more we have not made any such testings, and I took it for granted that my previous statements were in the minds of my hearers. I also believed that no one would succeed in arguing any likelihood of the gas being impure, and I confess that, had I thought there would have been such an apparent unanimity—*i.e.*, so little criticism of my *modus operandi*—I would have included matter in the paper that I reserved for discussion after it. Taking your editorial hint, therefore, I have ordered the experiments to be recommenced; but I will not be able to give you the results, as, from changing my offices, it will be some time before my laboratory is re-erected. I have, however, in looking up old papers, come upon the report of our late superintendent, Mr. Norwood Earle; and if you will do me the favour to publish it, your readers will see that I spoke against myself when I stated 12 to 16 grains, for the highest that we found appears to have been 12·7, the lowest 10·5, the mean of six experiments being only 10·06 grains per 100 feet of gas.

Perhaps, for the edification of many members who may find the performance of the test, as usually carried out, both irksome and difficult, you might also publish the six concluding experiments which were made by mere evaporation of the water of combustion—an experiment which takes much less time, and, where great accuracy is not wanted, will serve for every purpose. In this case, the average of six experiments being 12·5, as against 10·06, we have an increase of about 24 per cent., due, perhaps, to the presence of salts of nitre, which excess could be deducted so as to arrive at the true amount due to sulphur.

I beg you to observe that, although the experiments continued over six days, when the purifying material must have been presented to the gas in nearly all its conditions of impurity, yet the daily testings give great uniformity.

I am of opinion that our gas is purer now than it was in 1872, for we have been daily learning the great importance of thorough washing and of regular supply of water to the scrubber, and, since then, I have put a counter to the scrubber, in order that we may know from day to day the quantity of water run through, and thus be enabled to have our ammoniacal liquor of uniform strength.

Mr. Earle's report was written to me as between employer and employed, but I have no objection—indeed, would prefer—that you publish his letter to me as well as the table of experiments.

4, *Cannon Row, Parliament Street, S.W.*, *Aug.* 6, 1874. George Anderson.

"*Dover, Sept.* 16, 1872.

"Dear Sir,—I beg to hand you the results of the testings for sulphur. The following plan has been adopted:—Six separate experiments were made, extending from the 17th to the 23rd of August, and the liquor obtained from each experiment was again divided into three parts. One part has been tested as directed by the London gas referees in their instructions dated March 30, 1872; another has been evaporated, and the sulphur estimated from the residual sulphate of ammonia; and the remainder preserved in case it should be desirable to verify the correctness of any of these analyses.

"The air supplied to the Bunsen burner in the testing-room was first of all passed through a Kukla's brass gauge for retaining sulphur, and also through calico kept saturated with lime water.

"The quantity of sulphur produced by the evaporation test seems greater than that by the referees, but this may perhaps be due to nitrate of ammonia formed by the burning gas.—I remain, yours obediently,

"G. Anderson, Esq." "Norwood Earle.

Tabulated Results of Testings for Sulphur, Aug. 17 *to Sept.* 11, 1872.

No.	1. Mode of Test.	2. Gas Registered. Cubic Feet.	3. Liquor and Washings obtained. Ounces.	4. Portion Tested. Ounces.	5. Sulphate of Ammonia obtained from No. 4. Grains.	6. Sulphate of Ammonia per 100 Cub. Feet. Grains.	7. Sulphur per 100 Cubic Feet. Grains.	8. Sulphte. of Barium in Liquor Tested. Grains.	9. Sulphte. of Barium in 100 Cub. Feet. Grains.	10. Sulphur per 100 Cubic Feet. Grains.	11. Reading of Barometer.	12. Reading of Thermometr.	13. Corrected Consumption of Gas. Cub. Feet.	14. Real Quantity of Sulphur in 100 Cubic Feet of Gas at Stand. Temp. and Pressure.	Remarks.
1	London Gas Referees	20	19	4	..	..	..	3½	83	11·3	30·3	78	9·7	11·6	No. 3 col. varies in each test owing to the quantity of distilled water used in cleansing apparatus, but this does not, of course, tell upon the results.
2	,,	10	9	4	..	..	..	3	82	11·2	30·2	78	9·7	11·5	
3	,,	10	11	4	..	..	..	3	82	11·2	30·2	78	9·7	11·5	
4	,,	10	11	4	..	..	..	3	82	11·2	30·1	78	9·6	11·6	
5	,,	10	12	3	..	..	..	3	90	12·4	30·0	72	9·7	12·7	
6	,,	10	12	4	..	..	..	2½	75	10·3	30·3	74	9·8	10·5	A good experiment.
														60·4	
												Gross Average.		10·06	
7	By evaporation	20	19	5	2·5	47	11·1	..	..	..	30·3	78	9·7	11·4	
8	,,	10	9	3	1·5	45	10·8	..	..	..	30·2	78	9·7	11·1	
9	,,	10	11	4	2·0	55	13·2	..	..	..	30·2	78	9·7	13·6	
10	,,	10	11	4	2·0	55	13·2	..	..	..	30·1	78	9·6	13·7	
11	,,	10	12	4	1·75	52	12·4	..	..	..	30·0	72	9·7	12·7	
12	,,	10	14	4	1·75	52	12·4	..	..	..	30·3	74	9·8	12·6	
														75·1	
												Gross Average.		12·5	

GIROUD'S RHEOMETER AND SUGG'S LAMP REGULATOR.

SIR,—I have no intention of commencing a polemical discussion in the JOURNAL OF GAS LIGHTING, or to uphold one kind of apparatus to the disparagement of another. My object in sending you communications from Paris is solely that of keeping your readers posted up in regard to important improvements realized by gas industrial operations in France, by calling their attention to operations or apparatus whose utility has been already established by practical experience. If I, therefore, now address to you a few words by way of reply to the letter of Mr. Sugg, which appeared in your issue of July 21, it is simply for the purpose of clearing up some points which I may have possibly left somewhat obscure in my recent communication.

Above all, I am anxious to establish the merits of Mr. Sugg's "lamp regulator," with which we have long experimented, and which has indicated a progress in our gas industry, since it was the first jet regulator really in use, and which fulfilled an urgent want. The general employment of this apparatus in all parts of the world is an undoubted guarantee of the advantages which Mr. Sugg's invention presents. It has found numerous imitations and modifications in almost every country. I have much desired to see the last improvements of this apparatus, but have vainly sought for the new model in the workshops of M. Brunt, where it only made a short appearance.

The success which has attended the apparatus invented by Mr. Sugg does not necessarily prevent the discovery of other improvements, and the rheometer of M. Giroud, which has been already described, depends on a principle entirely different to that of a mere pressure-regulator, and solves from another point of view the question of governing the jets. It is on this difference that I ask the favour of more precisely explaining my previous statements.

There is, in the first place, a notable difference in construction, for the membrane in Sugg's regulator is placed under direct atmospheric pressure; the gas only presses on its lower side, and, consequently, the upper portion is under the influence of atmospheric pressure. The bell of the rheometer, on the other hand, moves in a closed vessel, and the gas encircles it on all sides.

Another difference is apparent in working, for, to increase the consumption attending the use of Sugg's regulator, it is only necessary to employ a jet with a larger orifice. With the rheometer, on the contrary, there is no change as regards expense of gas under such a circumstance.

But the radical difference is more apparent when the working of the two arrangements is carefully examined. If, for example, a jet of any size is used with the rheometer, and the gas is allowed to pass little by little, the bell will not at first rise, and the gas will pass just as if no apparatus were present. On opening little by little the stop-cock through which the gas passes, the quantity of gas is simultaneously increased. Then, all of a sudden (for example, when the gas under the bell attains a pressure of 15 millimètres—0·6 of an inch), the bell rises, and the expense of gas afterwards remains constant (say, for example, 140 litres, or 5 cubic feet), whatever may be the subsequent augmentation of pressure. Changing only the jet, and recommencing the same experiments, the same results will re-occur; but gas to the extent of 140 litres will pass before a pressure of 15 millimètres is reached, if the second jet be of greater orifice than the first; and after 15 millimètres if it is smaller. Thus, for each jet there is a particular pressure at which the rheometer enters into work. With a rheometer estimated at 140 litres, and the jets employed in the city of Paris, the pressure is from 10 to 12 millimètres (say, 0·5 of an inch); but this pressure may be increased from 100 to 150 millimètres (say, tenfold), if it be required to use the 140 litres by one jet, or one hole. It must be remarked that, with the ordinary jets, the pressure at which the rheometer works is always practical, since the proper working of the instrument only absorbs some 6 to 8 millimètres; and, to ascertain at what pressure the rheometer commences to act and to regulate the passage of the gas, it is necessary to add to this pressure of 6 to 8 millimètres that necessary to effect the proper supply gauged by the rheometer when at work.

Trying the same experiments with Sugg's regulator, it was found that, allowing the gas to enter little by little, the consumption was increased in a similar ratio, as was the case with the rheometer up to a certain point (12 millimètres of pressure, for example, if care had been taken that the membrane had been sufficiently charged to give it that pressure) after which it would remain invariable, and would be fixed to the normal consumption of 140 litres. Thus, so far, the results of Sugg's regulator and the rheometer were alike. But when the jet was changed, and the experiment was recommenced, it was found as in the first case—that is to say, when the pressure of the gas reached 12 millimètres—that when it increased, although the apparatus came into action, the consumption remained fixed, but it was different (say, 160 litres, for example) and this *continued*, since there was afforded to the escape, which occurred always under 12 millimètres (the pressure given by the regulator), an opening of larger section. And if on this regulator giving 12 millimètres was placed a candle-jet with one hole, there was only found a consumption of some 40 to 50 litres.

To sum up. With the rheometer of 140 litres, all the jets consumed 140 litres, although the pressure was variable for each one which had the rheometer attached to it.

With Sugg's regulator, each jet consumed a different quantity, starting from the pressure (the same for all the jets) at which the regulator came into action.

The conclusion, therefore, is that the rheometer is a regulator of volume, and differs, consequently, absolutely from that of Sugg, which is a regulator of pressure; that with the rheometer, the measurement of the gas used is independent of the burner by which the gas escapes, while with Sugg's regulator, the size of the jet is an essential feature in the working of the apparatus for a given quantity of gas used.

Mr. Sugg must well know that the little additional force obtained by what he calls a "double regulation" (see *ante*, p. 87, fourth paragraph) is simply an obstruction causing a reduction of pressure, which can but be in proportion to the counter-pressure determined by the orifices of escape, and consequently does not govern the consumption. It is only a palliative against too great variations.

I shall not here discuss the questions of the durability and maintenance of the membrane of Sugg's regulator. I shall simply remark on the difference that exists between the escape in the membrane of the regulator and that of the bell in the rheometer. In the first case it is a veritable escape, for the gas passes freely into the air, since the membrane communicates with the atmosphere. In the second case the expenditure of gas is slightly more than ordinary, but the excess of gas burns at the jet. It therefore cannot be said that there is any escape; the gas is used at the jet.

In conclusion it may be observed that the very small dimensions of the Giroud rheometer cause no loss of light to occur beneath, by means of a projected shadow, and that it can be readily applied to any existing form of gas illumination, whether public or private, from the street-lamp to the chandelier.

Other questions as, for example, the moderate price and ease of management of Giroud's rheometer—may lead Mr. Sugg to understand why this little apparatus, which is only three years old, has so rapidly found an almost universal application. The reputation for its excellent working has been established at Madrid, Rouen, and a hundred other cities in Europe.

YOUR PARIS CORRESPONDENT.

Paris, Aug. 4, 1874.

SIR,—Your correspondent, "Civis Romanus," has written a letter founded upon a part of my letter to you upon "Giroud's Rheometer," which appeared in your issue of the 24th of July last.

He does not quite agree with me that the changing of a burner, to which a lamp-governor has been adjusted, necessitates readjustment of the governor to the new burner, to ensure similarity to the original standard consumption.

He asserts that a Giroud rheometer does not require readjustment if a larger burner than that to which it has been regulated has been substituted, although he admits that the apparatus is unfit for a smaller one. By this, I assume, he means it requires readjustment.

He does not tell us why it is desirable to substitute a larger burner for that which ought to be the best for the gas which is being burnt at it; neither does he appear to have read the paragraph in my letter which immediately follows, although it is represented in his quotation by dots. Had he done so, he would have seen that, although my experience in the practical working of lamp-governors in general does not lead me to believe that in all cases the substitution of a larger for a smaller burner can be made without to some extent altering the rate of consumption, yet, bearing in mind the conditions under which the Giroud rheometers are working at Paris, I distinctly say that the substitution of a larger burner for that one to which the governor has been regulated may not seriously affect the consumption. I further say that, nevertheless, if the governors are working under the average meter system, I should not care to do even that for fear of raising a dispute. I had in view, when I wrote this, the limit of error allowed in some places under the average meter system, and the possibility of smoking the lamps, which would preclude the substitution of larger burners; while acquiescence in the liberty of change would open the door to the employment of smaller ones, and lead to a possibly troublesome lawsuit between the buyer and seller of gas.

It is clear, then, that the assertion to which "Civis Romanus" objects, only, however, in part, is founded rather upon the practical working of lamp-governors than upon experiments in the laboratory. Let me ask him a question. Supposing it is agreed upon between the municipal authorities of a city and the seller of gas that the burners of the regulating apparatus may be changed *in situ* by either party at their discretion, how, without actual trial, can the two parties be satisfied that no improper burner has been substituted for that to which the lamp-governor or rheometer has been adjusted? There must, I think, be another trial made of the entire regulating apparatus after every alteration of the burner.

If upon that trial any variation (produced by any means) from the original adjustment is found, a readjustment must be made.

The theory of the Giroud rheometer, explained by your Paris correspondent, does not, in my opinion, prove to evidence, as "Civis Romanus" says it does, that the substitution of a larger burner for the proper one can in all cases be made without altering the rate of consumption.

It seems to me that disturbing causes, such as friction on the guide-rod, alteration in the density of the liquid in which the gasholder floats, and pressure at the point of ignition, must affect the formula given by your Paris correspondent, and make it look quite different when they are taken into the calculation.

At least, he makes no mention of these disturbing forces when he explains the Giroud rheometer; but, on the other hand, he finds a disturbing cause when speaking of the Sugg lamp-governor, which he calls tension. Really, this has no existence when the governor is in working order.

He says the theory of the Sugg apparatus is analogous to that of the Giroud rheometer, but that a cause of error can be perceived in the introduction of a variable force, which is the tension of the membrane, while this is *nil* in the bell of the rheometer. I have explained in my letter that the leathern gasholder of Sugg's lamp-governor corresponds with, and is similar in its action to, the metal gasholder of the Giroud rheometer.

The Giroud rheometer has, however, a guide-wire, which must fit very well, and is likely, under some circumstances, to become a serious cause of friction. The leathern gasholder has no guide. So I think it is hardly fair to charge the Sugg lamp-governor with a disturbing cause, which is not to be found in it excepting when it is quite out of order, and ignore one which is always present in the Giroud apparatus.

"Civis Romanus" also says that the Giroud rheometer is not a pressure-governor at all, but a regulator for constant volume. From its name I supposed it was a measurer of the flow of gas. I am of opinion that the ordinary Sugg lamp-governor and steatite burner (one apparatus) is nothing more nor less than a measurer of the flow of gas. The great advantage claimed for the Giroud rheometer—viz., that companies will have no longer interest in discussing the size of the burner to be used with them, since a large burner will only consume the same quantity as a small one, equally applies to the ordinary Sugg lamp-regulator. The burners fixed in them are always the largest which can be used—taking into consideration the quality of the gas—and they consume no more than did those very small iron ones formerly in use before the introduction of the Sugg lamp-governor and steatite burner, although they give a larger light.

As to the average meter indication, I have always said that

meters only prove the accuracy with which the lamp-governors do their work. The first and most important point in carrying out the average meter system is the regulation of the quantity to be consumed at all the lamps, and the amount of light to be got out of that quantity by means of lamp-governors and burners. The meters only check the time of lighting and extinguishing. It is evident that, considering there is only one lamp in every 12 or 20, the consumption of which is measured, that the success of the system depends upon the accurate maintenance of a like consumption per hour at all the rest by the use of governors and burners.

It has never been proved that, in this respect, the Giroud rheometer has shown any equality, much less superiority, over the ordinary Sugg governor.

It is difficult to see how, under the circumstances which usually lead to the adoption of the average meter system, any governor can obviate the necessity of meters.

"Civis Romanus," in common with your Paris correspondent, evidently consider the merits of the Giroud rheometer when it is working under the most favourable circumstances for its success—viz., with an extremely low pressure at the point of ignition, and with a quality of gas which permits of the employment of a burner of large aperture.

The difference of the pressure in the mains at midnight—say 6-10ths—and that at the point of ignition—1-10th—gives great power to any governor, and enables it to overcome the difficulties of friction, &c., more easily than if the reserve force of pressure were diminished by raising the pressure at the point of ignition, to, say, 4-10ths, without a corresponding increase of the pressure in the mains. I think it possible also that an increase in the size of the aperture of a burner for rich gas burning under 4-10ths or more at the point of ignition, would be of very much more consequence than it is with low pressures and poorer gas under the same circumstances.

Practically speaking, therefore, I am of opinion that the governor and its burner, upon whatever system it is constructed, must be considered one instrument, and that any injury or alteration to one part or the other must be followed by the removal of the entire apparatus for retesting and readjustment.

WILLIAM SUGG.

Aug. 7, 1874.

POISONING BY INHALATION OF COAL GAS.

SIR,—I have read with interest the remarks in your paper of the 4th inst. on the pamphlet by Dr. Wm. Taylor on gas poisoning. There is, in more respects than one, a laxity about its statements to which we are happily unaccustomed. The note at page 18 is, probably, an addition since the paper was read before a society, but the author's degree implies an educational training which should have protected him from making a statement so absurd, and a social position which should have protected others, quite as honourable as himself, from a slanderous charge, the groundlessness of which the use of reflection or experiment ought to have made apparent to him. The author is, however, so consistent as to be equally reckless with his figures, and his blundering appears to have been unperceived by the scientific body before whom he read his paper. According to the data given, the poor sufferer in the hotel in Edinburgh, at 18 respirations per minute, would have taken upwards of 11 hours, instead of the 71 minutes stated, to exhaust the air of the apartment in which he was found. The effect of the gas on the patient was unquestionably produced by its being conveyed towards him, and breathed by him, before it was diffused through the air, and no one can tell in what proportion it reached him—experience points to its having been almost undiluted.

I hope no one will uncharitably harbour a suspicion that, while the medical faculty have excluded young ladies, they have not altogether succeeded in preventing old women from entering the profession.

SCOTUS.

DEFECTIVE METER INDEXES.

SIR,—The case of the defective meter index, referred to in a recent trial reported in your JOURNAL, appears to me of such an extraordinary nature that, with your permission, I should be happy to make some observations thereon.

As I understand the question, the wheels and pinions of the first and second dials (the 1000 and 10,000) were correct, and consequently the indication of their dials was accurate, but the wheel of the third dial, instead of having 60, had 63 teeth, and was incorrect, but in what manner is now the question.

The defective wheel being recognized, it was stated, on behalf of the gas company, that by employing the meter to which this index was attached for every 10,000 feet of gas passed therethrough the company would sustain a loss of 5000 feet, and that during two revolutions of the pointer of the *third* dial a loss of 10,000 feet would be incurred. Both of these statements would be perfectly correct if the consumption were ascertained from the third dial *alone*, without any reference to the first and second; but in practice the very opposite of this is the case, the quantity consumed being taken from the first and second, without any reference to the third, which is made strikingly evident in this instance, as only at the end of five or six years was the defective position of the hand ascertained.

According to the company's counsel, the pointer of the third dial had made four revolutions, and was going round for the fifth, of which we may suppose about 72,000 feet had been indicated, and under these circumstances the pointer would be in the position in which it was discovered, marking something less than eight on the third dial, as it would retrograde one figure on that dial for every 200,000 feet passing the meter.

That the index was taken from time to time from the first and second dials only there can be no doubt, otherwise how could the error of the first revolution have passed unnoticed, the third pointer being then at zero, whilst the second was at 5000? Besides, for the company to lose the amount stated, the inspector would have to deduct 5000 feet from the account every time the pointer arrived at zero.

I may observe that frequently the consumption is taken from the first and second dials, without reference to the third; and only recently a case came under my notice where there was a variation of 6000 feet between the quantity indicated and the meter, and that placed on the consumer's card, and it is my belief that in the case in question the company and witnesses fell unconsciously into an error, and if this should convince them, cognizant as I am of the high honour of all parties, they will not hesitate to rectify it.

ENGINEER.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, AUG. 3, 1874.

The Wakefield Water Bill returned from the Commons with the amendments agreed to.

SANITARY LAWS AMENDMENT BILL.—The Queen's consent signified; House in committee (according to order); amendments made; the report thereof to be received to-morrow, and Bill to be printed as amended.

TUESDAY, AUG. 4.

ROYAL SANITARY COMMISSION.—Second report, vol. iii., part 2. Tabular abstract of answers in writing received to circular questions issued by the Commissioners, and letters and memoranda presented (by command), and ordered to lie on the table.

SANITARY LAWS AMENDMENT BILL.—Amendments reported (according to order); further amendments made; Bill to be read third time to-morrow.

WEDNESDAY, AUG. 5.

SANITARY LAWS AMENDMENT BILL.—Read a third time with amendments, passed, and sent to the Commons.

SANITARY LAWS AMENDMENT BILL.—Returned from the Commons with amendments agreed to.

THURSDAY, AUG. 6.

SWINDON WATER-WORKS COMPANY, LIMITED, *v.* WILTS AND BERKSHIRE CANAL NAVIGATION PROPRIETORS.—Petition of appellants that time for lodging cases may be extended to third sitting day of next session; also joint petition of appellants and respondents, for leave to lodge a joint appendix, read, and ordered as prayed.

FRIDAY, AUG. 7.

SANITARY STATISTICS.

Earl FORTESCUE moved for return of the sums expended in each year from 1861 to 1873 inclusive, by the sanitary authorities, on drainage and sewerage works and on works of water supply in all towns in Lancashire containing more than 100,000 inhabitants according to the census of 1871; also, return of the number of deaths in each of such towns in each year from 1861 to 1873 inclusive, under the age of 5, between the ages of 5 and 20, and above 20, distinguishing the deaths from zymotic diseases, and classifying all the deaths under the heads of gentry and professional persons and their families; tradesmen, &c., and their families; labourers, mechanics, and servants, and their families, in the same manner as in the report on the sanitary condition of the labouring population of 1842, pp. 158-9, &c.; and a similar return, similarly classified, for the county of Rutland.

The motion was agreed to.

The sixth report of the Rivers Pollution Commissioners, on "Domestic Water Supply," was presented.

The Sanitary Laws Amendment and Wakefield Water Bills received the Royal Assent by commission.

HOUSE OF COMMONS.

WEDNESDAY, AUG. 5, 1874.

PUBLIC HEALTH ACT (1872).—Copy ordered of "Reports of Local Government Board Inspectors on the Working of the Public Health Act, 1872," on the motion of Mr. STANSFELD.

THURSDAY, AUG. 6.

METROPOLITAN WATER SUPPLY AND FIRE PREVENTION.—A return was presented of copies of letter, dated May 14, 1874, from the secretary of the Society of Arts to the President of the Local Government Board, pursuant to order made June 25, on the motion of Colonel Beresford.

Legal Intelligence.

COURT OF CHANCERY.—THURSDAY, AUG. 6.

(*Before Vice-Chancellor Sir* R. MALINS.)

In re THE PETERSBURG AND VIBORG GAS COMPANY, LIMITED.

This is a petition, praying a winding-up order against the above company. It had been mentioned on the previous day, when, after a somewhat lengthy discussion as to the advisability of its being heard (as it is a matter of considerable importance, and will therefore occupy some time in argument) on the eve of the long vacation, it was adjourned until to-day. The petitioners were willing that it should stand over till November, but counsel for the company would not agree to that proposition, on the ground that the pendency of the petition would be utter ruin to the undertaking, as it would disable the company from entering into contracts for the completion of their works.

Mr. GLASSE, Q.C. (with whom was Mr. Latham), now stated that, inasmuch as this was an undertaking in which the petitioners felt that their money was to be called up and spent uselessly, he would at once assure the learned counsel on the other side that, even should they succeed in persuading his honour not to grant the winding-up order asked, the decision would be immediately appealed against. Under those circumstances, it would be an utterly useless waste of time to attempt to dispose of the case, as the pendency of the appeal would be equally fatal to the company.

The VICE-CHANCELLOR: I am quite ready to devote the next two hours to it, but this is the last day of the sitting of the court.

Mr. GLASSE said he could not undertake to finish within that time, as the matter was one of very considerable importance, and he must, of course, do his duty to his clients. The petitioners were the Patent Gas Company, Limited, who possessed a very valuable and promising patent, and it was well known that their shares had gone up to a premium. They were incorporated under the Companies Acts on Feb. 28, 1872, and the first paragraph of the petition honestly and fairly stated that, in consequence of ill success, resolutions had been passed for a voluntary winding up. The Petersburg and Viborg Gas Company, Limited, was incorporated on the 7th of October, 1871, and their Memorandum of Association provided that the office of the company should be situate in England. The objects of the company were to purchase a concession granted on the 13th of February, 1870, for making and completing gas-works in, and lighting with gas the streets, squares, and river banks of Petersburg and Viborg, and to make and complete the gas-works, and light with gas the places comprised in the concession, and to lay down main, service, and other pipes, and in all other respects to comply with the terms and conditions of the concession. Now, not one single atom of that had been done. Then they were to apply for and obtain, purchase, or otherwise acquire any extension of the concession, or any new concession, for the construction of any other gas-works in the empire of Russia, and to construct the works and light with gas the district or place to be authorized by any such extended or new concession. Nor had there been anything done under that clause of the memorandum. The next paragraph stated that they were to sell, or lease, or otherwise dispose of all or any part of works so to be acquired, to any person or company, and to purchase, acquire, or take on lease any gas-works in Russia, already or hereafter to be established, and also to purchase, or take on lease, or otherwise acquire possession of the working of mines of coal and lands in Russia or elsewhere, in which coal, or any other product capable of yielding gas, might be

supposed to be, and to purchase, sell, and deal with coals, or any residual product, and also to dispose of such mines and lands, or any other property of the company, in such manner as might from time to time be considered expedient. And then there was power to recover rates, and so forth, and to do all necessary things. The capital of the company was to be £150,000 in 15,000 shares of £10 each. In July, 1872, the petitioners applied for 1000 shares in the company, which were allotted, and, in the first instance, registered in the names of trustees, but in March, 1873, in the petitioners corporate name. £2 10s. only had been called up on each of the shares, and therefore there was £7 10s. still due. On the 23rd of January, 1873, an agreement was entered into between the petitioners and the Viborg Company, by which they were to have the power of using the Patent Gas Company's processes; but it was not necessary to trouble the court further with that, as nothing now turned upon it, neither liability nor right arising thereunder. The petition then state that the Viborg Company had entirely failed to perform their part of the agreement, and could not do so, though the petitioners were willing to carry out theirs. The period of the concession referred to in the agreement had expired, but an extension of time had been obtained; the Viborg Company, however, had done nothing in Russia beyond obtaining the concession and purchasing some land. It was clear, therefore, said the learned counsel, that they had erected no works, and had taken no steps whatever for carrying into effect the special objects of the company. They had simply obtained a bit of land—whether it had been conveyed to them or not he did not know, but he believed not. The company had allotted 10,700 shares, of which 700 were fully paid up; therefore, upon the 10,000, the total capital paid was £25,750, the whole of which, with the exception of a balance of £1500 at most, had been expended in obtaining the concession and in unproductive preliminary expenses. They had further never issued a balance-sheet or statement of accounts. Many of the present shareholders were unable to pay calls. The cost of the works necessary to carry out the concession was estimated at £75,000 and upwards, being more than could possibly be realized by calls on the shares allotted, and no further money could be raised by the Viborg Company by any means whatever. The court must be reminded that no borrowing power could be exercised without something to borrow upon, and the company possessed nothing but this piece of land, upon which there was a mortgage for the full value. The petition then proceeded to state that if the company commenced works which they could not finish, the money expended on them would be almost entirely thrown away. The directors of the company neglected to call a general meeting, and, in consequence of the very stringent nature of the Articles of Association, the petitioners were unable to compel them to call a meeting. By amendments of the Articles of Association of the Viborg Company, purporting to have been effected by special resolution, confirmed on April 23, 1873, the nominal capital of the company was increased to £250,000, and power was given to the directors to pay interest on shares out of capital, which powers the directors had exercised, and intended further to exercise. The petitioners finally submitted that it was not within the power of the company to so amend their Articles of Association. The learned counsel said he need not remind his honour that what the directors had done was absolutely *ultra vires*, as had been decided in the case of *Hutton v. The Scarborough Hotel Company* (3 Drury and Smale).

The VICE-CHANCELLOR: I suppose you will endeavour to bring your case within that test?

Mr. GLASSE said it was as absolutely impossible for the constitution of a public partnership to be so altered as it would be in the case of a private partnership; and the court would not, in those circumstances, allow the money of shareholders to be thrown away, and such a scheme as this to be carried on at a plain and appareat loss, merely because the majority desired it.

Mr. JOHN PEARSON, Q.C. (with whom was Mr. Brooksbank), said he appeared for the company and for the holders of 9325 shares, who were all strongly opposed to the petition.

The VICE-CHANCELLOR: You have nine-tenths of the shares. Would not this be a proper case to call a meeting?

Mr. KARSLAKE, Q.C., who appeared separately for the proprietors of nearly 4000 shares, said that had been done, and a resolution had been passed by the meeting entirely disapproving of the petition.

Mr. GLASSE said though a meeting had no doubt been called, it was an informal one; but if a proper meeting were called, the petitioners would offer no objection.

Mr. PEARSON said the petitioners attended, and voted at the meeting, and there was only one dissentient.

Mr. GLASSE asked whether that would make an informal meeting valid? He would press upon the court two things: that in the first place the directors could not alter the Memorandum of Association and thus alter the constitution of the company, and in the next place that they were acting *ultra vires* in paying interest out of capital.

The VICE-CHANCELLOR: What is the value of these shares? Are they of any marketable value?

Mr. GLASSE did not think they were of the value of a rush. He was quite willing to give up his shares upon receiving an indemnity against future calls.

The VICE-CHANCELLOR: That is a very generous offer.

Mr. GLASSE only desired to be understood that he would not have the remaining £7 10s. called up on his shares and thrown away like the rest.

The VICE-CHANCELLOR said though he had had many of these cases before him since the Scarborough Hotel case was decided, he had never had occasion to change the view he then took. He still strongly entertained the opinion that where there was further liability upon shareholders in a company, and it was made apparent to the court that the result of allowing further calls would be merely to throw the money of the unfortunate shareholders away, that was a case in which it was just and equitable that a winding-up order should be made. If that were shown in the present case, he would certainly not be bound by Lord Cairns's decision to the contrary in the Suburban Hotel case, but would make the order, and leave it to any other tribunal who might think differently to do as they pleased.

A long discussion then ensued upon the precise effect and bearing of the two cases mentioned.

Mr. PEARSON said the Viborg Company had got a valuable concession, and had purchased land for their purposes in St. Petersburg. The purchase-money was being paid by instalments as stipulated, and they were diligently proceeding with the necessary formalities to enable them to establish their works and commence operations. The petitioners offer to surrender their shares could not be accepted, as the company would rather have the calls.

Mr. GLASSE was content to lose the £2500 he had already paid, but did not want £7500 more dragged out of his pocket.

Mr. KARSLAKE said it would be *ultra vires* for the directors to enter into any such arrangement.

Mr. GLASSE submitted it was clear the company was in a hopeless condition, for they had been going on now for two years and a half, and had not yet even paid for their land. The ground had not been conveyed, and they had not turned a sod or put in a brick. In addition to that, what the directors were doing was directly in the teeth of the original Memorandum of Association, and those facts alone, according to the decisions in the cases which had been already cited, entitled him to the order asked. With regard to the allegation in the petition of the inability of many of the shareholders to meet their calls, if his honour would refer to the list he would find the name of one gentleman at least not unknown to fame, Mr. Begbie, who held 1100 shares, and who was also a bankrupt. Not one shilling could ever be got from him, of course, whereas the directors knew perfectly well that was not the case with respect to the petitioners.

Mr. PEARSON asked for evidence in proof of these statements. The court could not entertain the idea of listening for a moment to such statements as to the pecuniary position of gentlemen behind their backs.

The VICE-CHANCELLOR: You might make me out to be insolvent in that way.

Mr. PEARSON: We might all be made out insolvent.

The VICE-CHANCELLOR: The opponents of this petition hold amongst them 9000 shares, and they seem to have so little confidence in the concern that they will not take over these 1000 shares as a gift.

Mr. KARSLAKE: We have no power.

The VICE-CHANCELLOR: You can do it as individuals. You have so much faith in this undertaking that you will not take a transfer.

Mr. GLASSE said he was willing to transfer his shares, or, if the company would satisfy him that the contracts they had entered into, or were in the future to enter into, whenever the time came, could be completed within the scope of the means they could command, he would not press for the winding-up order, but would be content to keep his shares. A considerable number of those who held the 9000 shares could not pay 1s. of calls, but the directors desired to get the calls from the petitioners, in order to grease the wheels at St. Petersburg.

Mr. KARSLAKE said one of the opposing shareholders had come into a fortune, at all events.

The VICE-CHANCELLOR said it was evident the hearing of the petition could not be concluded that day, and he could do nothing else but order it to stand over until Michaelmas Term.

Mr. PEARSON earnestly protested against that being done, and felt sure his honour would have no difficulty at all in dismissing the petition in a quarter of an hour.

The VICE-CHANCELLOR: It is of no use attempting to hear it. I cannot hear it out. It is not a matter to be dealt with lightly, because it raises the question of the discretion of the court. I have no doubt the company will say that buying the land amounts to a commencement of business; that will have to be argued, and then there will be the question whether the company is able to pay its debts. Therefore, it resolves itself into a very difficult question whether it is just and equitable that the company should be wound up. I have already told you, if it is made plain to me that the company have no prospect of going on, I shall consider it right to make the order, but the arguments will take several hours.

Mr. PEARSON: Just let me put this to your honour, whether it is to be established as a precedent that any shareholder who wishes to get rid of the liability upon his shares is to be at liberty, by filing a petition, to force the remaining shareholders to take them over.

The VICE-CHANCELLOR: I do not say anything of the kind.

Mr. PEARSON: That is what it comes to—whether a shareholder is to be at liberty, by doing so, to run away from his bargain.

The VICE-CHANCELLOR: He is not running away from his bargain. Here is a shareholder who is liable to pay £7500 upon his shares in what he considers a hopeless undertaking, and if it is made apparent to me that he will simply lose it, and throw it away, I will make the order. However, I cannot hear it now—there are five counsel still to address me.

Mr. GLASSE: And if they make out any case at all your honour will then have to hear me in reply.

The VICE-CHANCELLOR: Besides, it is certainly a case in which I should not decide without carefully reading all the documents and authorities.

Mr. GLASSE: If my friends will satisfy me during the long vacation that they can go on with their contracts, I will renew my offer.

Mr. PEARSON: How can I satisfy people who are determined not to be satisfied?

The VICE-CHANCELLOR: I can do nothing further in the matter now.

After some further discussion, the petition was ordered to stand over till Michaelmas Term, with liberty to apply to the vacation judge.

YORKSHIRE SUMMER ASSIZES.

WEST RIDING DIVISION, LEEDS.—THURSDAY, AUG. 6.

(*Before Baron* AMPHLETT.)

UNLAWFULLY TAKING WATER FROM THE LEEDS CORPORATION.

William Smithies, engineer, was indicted for stealing 1000 gallons of water, the property of the mayor, aldermen, and burgesses of the borough of Leeds, at Leeds, on the 1st of May last.

Mr. TENNANT and Mr. ASPINALL, instructed by the town-clerk, appeared on behalf of the prosecution; and Mr. LOCKWOOD, instructed by Mr. Granger, defended the prisoner.

Mr. TENNANT, in opening the case, explained the original way in which Leeds was supplied with water—that was, by a company established by Act of Parliament in 1837. In 1847 the company was re-established, and the works, premises, &c., belonging to the old company were revested in the new company. This continued until 1852, when an Act of Parliament was passed by which the company were entitled, among other things, to transfer their rights to the corporation. It was necessary to mention these Acts to show that the water was private property, and might be a subject of the larceny.

Mr. LOCKWOOD said that the first objection he should take would be that the water was not a proper subject of the larceny.

His LORDSHIP said that if the water was not reclaimed it was common to every one, but since it was reclaimed it was a subject of larceny.

Mr. LOCKWOOD asked that his lordship would reserve this point, which he agreed to do.

Mr. TENNANT said that by the Leeds Water-Works Act, 1867, it was provided that every person who, not having agreed to purchase water from the corporation, took or used any water from any reservoir of the corporation, should forfeit to them any sum not exceeding £10.

Mr. LOCKWOOD submitted that the Act last mentioned provided a remedy in such cases as the present, and what the prosecution should have done was to apply that remedy.

His LORDSHIP: What you contend is that the water is not a subject of larceny; and if it was, there being a penalty, supersedes any right to an indictment.

Mr. LOCKWOOD repeated his objection, and

His LORDSHIP said he should overrule the objection, reserving the points.

Mr. TENNANT then proceeded to state the case, and said that the prisoner had been for a long time in the employment of Mr. Snell, cloth manufacturer, Leeds, as engineer. Mr. Snell was supplied with water by the Leeds Corporation, and he had likewise made application and had been supplied with a fire-plug for his premises. The regulations with regard to persons using the corporation water for manufacturing purposes were that the water would be brought on the premises by means of a meter, so that the quantity consumed might be known. In reference to the fire-plugs it was different, as in that case a fixed charge of £2 yearly was made, and the person having the fire-plug had the right of exercising it four times a year, but only in the presence of some of the corporation officials. On the 10th of November last Mr. Snell gave notice to the corporation that he no longer desired to be supplied with their water, as he would be able to obtain a supply from wells on his premises. An official of the corporation thereupon attended and took away the meter, and closed the

end of the large pipe which supplied the water. This did not interfere with the fire hydrant, from which water could be taken independently of the other supply. On the 10th of January last a plumber attended at Mr. Snell's premises, and in the presence of the prisoner fixed a pipe attaching the fire hydrant with the end of the pipe which had been closed, thus obtaining as good a supply of the corporation water as before. This, the prisoner stated, would be cheaper for his master than the former way. That was perfectly true, as by the former method the cost was about £10 or £12, whilst in the other case he had only to pay £2. The works were supplied with water in this way up to May last, the prisoner giving instructions to the watchman, Braithwaite, to turn on the water every night and fill the cisterns. Braithwaite eventually gave information at the town-hall of what was going on at Mr. Snell's premises, but by the time the corporation officials inspected the place matters had been put in their original state in November.

Evidence was called in support of these statements, and Mr. *Snell* was also placed in the witness-box by the prosecution, and examined by Mr. LOCKWOOD. He stated that he had never given authority to the prisoner to act as he had done, and if he had known of the matter, he should have stopped it at once. The prisoner had borne an excellent character.

This closed the evidence, and Mr. LOCKWOOD asked if his lordship thought that there was a case for the jury.

His LORDSHIP said there was a case, but he did not know but that the object of the prosecution had already been met.

Mr. TENNANT said that it would now go forth to the public that persons unlawfully taking the water of the corporation subjected themselves to the penalty of larceny, and the corporation had, therefore, no wish to press this case further.

His LORDSHIP said he thought the corporation had taken a very proper and, under the circumstances, a very considerate course in what they had done. He added that there was no doubt that the prisoner acted improperly, but he believed he was unaware that he was committing an unlawful act.

The prisoner was then discharged.

MANCHESTER ASSIZES.—WEDNESDAY, AUG. 5.

(*Before Justice* ARCHIBALD.)

STALYBRIDGE GAS COMPANY *v.* SIMPSON.

The plaintiffs in this case sought to recover from the defendant, a coal merchant at Stockport, damages in respect of the non-fulfilment of a contract entered into by him in May, 1872, for 5000 tons of Clifton Hall and Agecroft gas coal, at 13s. 4d. per ton.

Mr. EDWARDS, Q.C., and Mr. GOULDTHORPE were counsel for the plaintiffs; and Mr. POPE, Q.C., and Mr. JORDON for the defendant.

From the statement of counsel for the plaintiff, it appeared that the contract provided for the delivery of the coal in equal monthly instalments, extending over a period of 18 months. From November, 1872, to November, 1873, the defendant failed to deliver the amounts specified, and the plaintiffs were, in consequence, compelled to go into the market and purchase. Coal having risen in value since the date of the contract, they sustained a loss of £906 15s. 6d., and this was the amount now sought to be recovered. The defendant, in entering upon the contract, wrote to the plaintiffs: "If by any strike or unforeseen accident it be impossible for us to fulfil the contract, we shall consider ourselves only bound to do the best under the circumstances." The burden of proof, Mr. Edwards contended, that a strike or "unforeseen accident" had occurred, rendering delivery impossible, rested upon the defendant.

At this stage a suggestion was made with a view to settlement; and after some discussion—in which Mr. POPE stated that a fire at the Agecroft Colliery was the cause of the non-delivery—a verdict was taken for the plaintiffs, by arrangement, for £250.

WEDNESDAY, AUG. 5.

(*Before Justice* ARCHIBALD *and a Special Jury.*)

LIBEL UPON THE LATE MANAGER OF THE ACCRINGTON GAS-WORKS.

BARRATT *v.* BOOTHMAN.

Mr. POPE, Q.C., and Mr. ADDISON appeared for the plaintiff; and Mr. KAY, Q.C., and Mr. JORDAN for the defendant.

The plaintiff, Mr. *William Barratt*, was until lately manager of the Accrington Gas and Water Company; and the defendant, Mr. *John Boothman*, is an accountant, carrying on business at Accrington. The action was brought to recover damages in respect of certain defamatory libels published by the defendant. The defendant pleaded, in the first place, not guilty; and secondly, a justification of the several charges made by him.

Mr. POPE said that the case, so far as the plaintiff was concerned, was one of the utmost gravity, because, if the defendant's contention was made out, it involved the entire sacrifice of his (the plaintiff's) character. The plaintiff had, in consequence of the painful circumstances about to be detailed, resigned his position at Accrington, and had—subject to his character being cleared by this action—received an appointment at Grantham. The charges were such as, if maintained, would be sufficient to preclude his employment anywhere. The plaintiff was appointed, in July, 1869, engineer to the Accrington Gas and Water Company, at a salary of £200 a year—which was subsequently raised to £300—with certain allowances, and in that position he remained until the 16th of April in this year. He, however, continued to act until the appointment of his successor in June. At the date of his appointment, in 1869, one William Boothman was in the company's service as foreman of meter inspectors and repairers. He was, for reasons then deemed sufficient, dismissed by the plaintiff in March, 1873. At that time the defendant, John Boothman, was a member of the Accrington Local Board; and William Boothman (who, he was informed, was no relative of the defendant) was taken into the employment of that board as lighting inspector. An election took place of members to the local board; John Boothman was a candidate, and the plaintiff, not approving of his candidature, actively opposed him; whereupon the defendant expressed a determination if possible to drive him from the town. The first charge made by the defendant against the plaintiff was that William Boothman, the discharged foreman, by his (the plaintiff's) direction altered the meters attached to certain street-lamps so as to show that the local board had consumed more gas than they really had consumed. In the *Accrington Times* of the 4th of April there appeared a letter bearing the signature of John Boothman, and headed, "A Nut to Crack for the Local Board at its Next Meeting." In this the defendant sought to show, by a comparison of certain dates, that something must be radically wrong, because the consumption of gas was much larger than could be accounted for. This letter was followed by a petition to the local board, for which the defendant was also responsible, in which he (the defendant) alleged "the ratepayers of Accrington have been charged for gas which has never gone through the local board meters, and they think it a matter of grave importance, and one which should be inquired into." That petition was dated the 4th of May, and was referred to a committee for investigation. Of the committee's proceedings at their meeting on May 13, a report was furnished to the *Accrington Times* by the defendant. There, and in the report of an adjourned meeting, the plaintiff was distinctly charged by the defendant with being the author of the alleged frauds. The fact was Mr. Barratt had no pecuniary interest in the gas company as a shareholder or otherwise; and if it were true that he had been guilty of such frauds they would not have profited him in any sense. The defendant subsequently wrote: "I am prepared to prove that certain meters have been tampered with, and that the fingers have been moved to make it appear that the consumption of gas was greater than it actually was, by Mr. Barratt's instructions." The investigation by the committee took place during Mr. Barratt's absence from home. He returned to find the town in a state of ferment on this question. He would tell the jury that there was no foundation for the charges made against him. They were falsely and wickedly fabricated, and circulated for the purpose of doing him injury.

The plaintiff was then examined, and he specifically denied the charge of having instructed William Boothman to tamper with the meters attached to lamps in Accrington.

The further hearing of the case was adjourned.

THURSDAY, AUG. 6.

The hearing was resumed this morning.

The *Plaintiff*, in cross-examination, denied the truth of the statements made against him as to the alteration of gas-meters. On one occasion, finding that a lamp containing a meter had not been lit for some time, and therefore did not correctly indicate the gas supplied to that locality, he adjusted the account between the company and the local board, only, however, after consultation with the local board officials. He never directed any alteration of the meters.

William Boothman, on whose statements the defendant had relied in the publication of the alleged libels, said he had been asked by the plaintiff to alter the gas returns. Witness had replied that he could not alter the returns without altering his books to correspond. The plaintiff said, "Alter them, then." Witness made an amended return, corresponding with alterations made in red ink in the original return by the plaintiff. Witness broke the seals of different meters, and made the indicators correspond with the amended return, and, after fastening them up again, reaffixed the company's seal.

In cross-examination, *witness* admitted that he had been in prison at Preston for six months for cheating a club, to which he belonged, out of £65.

The defendant, *John Boothman*, stated in evidence that he relied on the statements of the last witness; and on comparing the gas accounts of 1873 with those of 1872, and finding the consumption of gas greater, with fewer lamps, than in the latter year, he took the steps he did in order to get the plaintiff to explain the discrepancies to the ratepayers. He published the placard to the effect that the plaintiff's son was wanted for forgery after receiving certain letters, produced, from the employers of the young man. He denied any feeling of malice against the plaintiff.

In cross-examination by Mr. POPE, *witness* said he assisted at the burning of voting papers in 1862 in order that Mr. Swain Rhodes might be returned to the local board. In 1869 a vote of censure was passed upon him for taking money from a co-operative society for helping to get plans passed by the board, he being a member of the board. In 1872 he served seven days in Preston prison for tampering with voting papers. He had also been tried for perjury in Lancaster, but acquitted. That was in a bastardy case. He had brought an action against the Lancashire and Yorkshire Railway for compensation for personal injuries. The railway company admitted negligence, but pleaded that witness was not injured, and was making a fraudulent claim. The jury took the Lancashire and Yorkshire Company's view of the case, and declined to give witness damages.

The JUDGE, in summing up, commented on the scantiness of the information on which the defendant had proceeded in his assertions against the character of the plaintiff. He pointed out that Barratt had nothing to do with the accounts, and had nothing to gain by the meters being put forward. The question was for the jury whether they believed the defendant at all after what they had heard. There had been evidence given to show that the defendant was actuated by the most malevolent ill-feeling towards the plaintiff. The defendant said he acted upon some vague information, but he did not substantiate what he charged. Instead of coming forward and expressing his regret, he instructed his counsel to persevere to the end in the assertion that the matters were true, and he wholly failed to establish them. That was a very serious aggravation of the libel and defamation he had heaped upon the plaintiff, and it would be for them to say whether it was not a case in which an example should be made, to show that men were not at liberty, with impunity, to indulge all their malicious and malevolent feelings under the attempted disguise of public good.

The jury, without leaving the box, agreed upon a verdict for the plaintiff—damages, £500; the foreman expressing the opinion of himself and brother jurors that the defendant had been guilty of a base and malicious libel.

BARRATT *v.* WILLIAM BOOTHMAN.

This action arose out of the same libel as that complained of in the previous case, the plaintiff being the same, and the defendant being one of the witnesses for the defendant in the previous case. The same counsel were engaged, and it was announced, after the empanelling of the jury, that a verdict would be taken by consent for the plaintiff for 40s.

MARLBOROUGH STREET POLICE COURT.—SATURDAY, AUG. 8.

(*Before Mr.* KNOX.)

FRAUDULENT CONSUMPTION OF GAS.

Alexander Gellattley, a plumber, 6A, Oxford Market, was summoned by The Gaslight and Coke Company for consuming gas fraudulently. Two officers of the company gave evidence to the effect that the decreased quantity of the defendant's consumption of gas became so marked that suspicion was aroused, and it was discovered, on inspecting the premises, that the inlet and outlet pipes were so arranged as to enable gas to be consumed without passing through the meter, and that the meter was so filled with water as to impede the proper registration. The defendant, when accused of consuming unregistered gas, replied, "Yes; I could not get it in any other way."

Mr. BESLEY, for the gas company, said they might have proceeded against the defendant for stealing gas, but they adopted the more lenient course.

Mr. KNOX said a more flagrant case had never come under his notice. It was fortunate for the defendant that the company proceeded leniently. The full penalty, however, would be applied, in two proved cases, of £5 each, and five guineas would also be awarded for costs.

Miscellaneous News.

THE PRIESTLEY CENTENARY.

Saturday, Aug. 1, was the centennial anniversary of the discovery of oxygen by Dr. Priestley, and it was celebrated in the town of Birmingham by the inauguration of a white marble statue in the vicinity of the Town Hall, after the uncovering of which, Professor HUXLEY delivered a suitable address. Having reviewed the leading incidents of Priestley's life, he said he wished briefly to put before the meeting the value of Priestley's life's work to those who looked upon it from outside the region of the particular denomination to which he belonged. Priestley was a man of almost endless energy and versatility. In the first place, he was a man of science and a chemist; in the second place, he was a philosopher and a writer; in the third place, he was a politician; and he proposed to put before them those considerations that struck him in each of these directions. In order to estimate what Priestley did for chemistry, he must carry them back to the last century, and show them what was then the condition of chemical science. There was no one who believed, and hardly any one who suspected, that the doctrine of the ancients, that air, water, and fire are elements, was other than true. The researches of Boyle and Hayles had

tended to define the qualities of air, and to show that there were different kinds, but that there was anything like the multiplicity and diversity of elementary bodies which we now comprehend under the name of gases was entirely unsuspected. Immediately at the commencement of the second half of the last century, about the year 1755, a most remarkable man, a young Scotch doctor, Dr. Black, had made investigations into the nature of what was called fixed air, and he had shown that this substance could be combined with such matter as limes, and such as alkalies, and could be got out again from them by combustion; that it was an acid substance, capable of neutralizing the strongest alkali, and that this paved the way for an air-like body, an aëriform elastic substance, which would play the part of an independent existence totally distinct from common air. Then a little later, in 1776, Henry Cavendish, one of the most remarkable men who adorned the science of this or any other country, in his researches, showed the nature of sundry other gases. Shortly after Cavendish, Priestley commenced his inquiries, and scaled the walls of science, without preparation and from the outside. The number of discoveries he made was something marvellous, and without limit. He trebled the number of gases known before his time, and gave a precision and definition to our knowledge of their character, of which no one before had any conception. It was on August 1, 1774, that he made the discovery with which his name is more especially connected. There was no doubt whatever, and never had been any doubt, of the great importance of this discovery, which was taken up by other persons, and contributed essentially to the development of those views of Cavendish which led to the discovery of the true composition of water. Nor could there be any doubt that the hints which Priestley gave to Lavoisier, and which he was sorry to say Lavoisier very shabbily ignored, that these hints led to the conceptions of the importance and the functions of these gases which the French chemist subsequently had felt. He repeated that there could be no doubt as to the importance of the discovery which Priestley made, and the matter and fact which he discovered; but it was proper to remark that Priestley's contributions to chemical theory could not stand upon the same high pedestal as his increase of chemical knowledge. He did not suppose that even from the point of view of chemical knowledge they would be quite justified in putting him by such a giant as Cavendish, but in chemical theory Priestley was certainly unfortunate. He was full of the doctrine then current in his day, that combustion arose from the disengagement of a violent substance of an unknown character, which was called *phlogiston*. It was supposed that this matter was disengaged in combustion, and that air in which a body would no longer burn ought properly to be called dephlogisticated. To the end of his days Priestley remained in this view, and was unable to appreciate the remarkable revolution in chemistry that had been effected by the French chemists. And so, so far from taking what was sometimes ascribed to him, a just view of the composition of the atmosphere itself, it will be found that his conception of the atmospheric air was that it was a substance chemically comparable to saltpetre. In Priestley's time the acid contained in saltpetre was called nitrous acid, and Priestley expressly believed that atmospheric air was a combination of nitrous acid and some earthy matter—a speculation than which it was scarcely possible to go farther from the truth. But, as Dr. Priestley himself remarked in the course of his own researches, the great thing in science—the first thing—is to establish the facts; the second thing is to reason correctly from those facts; and, no doubt, the services which he had rendered by the establishment of a large contribution to that body of chemical fact was such that his chemical posterity to all times were not likely to forget.

The Mayor and Mr. George Dawson then addressed the meeting, and a party of 150 afterwards sat down to luncheon at the Great Western Hotel.

At Leeds, the celebration of the anniversary took place in the Philosophical Hall, under the presidency of Dr. Clifford Allbutt, who, in his opening address, said that, although Leeds was proud to claim Priestley as one of her sons, he was afraid our town could scarcely appropriate to itself the honour of being the place where oxygen was discovered. Within but a short interval of Priestley's residence here oxygen was discovered by him at the country seat of Lord Shelburne. It was in Leeds, however, that the discoverer commenced the most important of his experiments. As to the value of his discoveries, we could best estimate it if we could place ourselves in the position of people who lived in earlier times. The popular idea then was that there were only four elements—earth, air, fire, and water; also that air was an intangible, invisible matter, which might be more or less adulterated, but which was, nevertheless, in itself an ultimate element. It occurred to Priestley, however, that it was a compound element, and with this idea he pursued most industriously a series of researches which startled the minds of other investigators in the same direction. He was not the only chemical discoverer, nor mentally the greatest philosopher of his time; but he discovered the most important of all the airs or gases known to man—that most vital element now called oxygen. There were, doubtless, some greater philosophers in Priestley's time, but none more industrious and none more ardent, despite much hardship and persecution, in the pursuit of truth. There might be others living in Yorkshire now equally considerable in their mental ability or acquirements, who had only to be equally industrious and enthusiastic in order also to distinguish themselves and make another great discovery. The lesson of such a celebration as the present should therefore lead us to inquire whether every facility was now given to the spirit of enlightened research—whether our modes of life and thought, our studies, the social consideration given to scientific students, the tolerance of other people's opinions, and the welcome given to new things, were such as to encourage original investigators.'

The Rev. J. C. Odger, of Mill Hill Chapel, then read the first paper, which was on "Priestley's Life, chiefly in connexion with Leeds." Upon this subject Dr. Priestley himself wrote, "At Leeds I continued six years very happy, with a liberal, friendly, and harmonious congregation, to whom my services, of which I was not sparing, were very acceptable. Here I had no unreasonable prejudices to contend with, so that I had full scope for every kind of exertion." And, indeed, his activity in Leeds was most surprising. During the six years of his residence in the town he published no fewer than 30 treatises, some of considerable length, on theoretical, controversial, and philosophical subjects. As amongst his scientific friends in Leeds he especially mentions Mr. William Hey, one of the founders of the infirmary, with whom he was on terms of cordial intimacy, although they were utterly opposed on theological topics, and wrote pamphlets to oppose each other's opinions. Among the local institutions which owed their origin to Dr. Priestley, one was the Leeds Circulating Library, founded about the year 1770, and it was said that he had also much to do with the original commencement of the Philosophical Society, in whose premises they were now appropriately met.

Mr. T. Fairley, the borough analyst, read the next paper on "The Phlogiston Theory," with experiments. Incidentally, he expressed his belief that oxygen was really discovered in Leeds, although the discovery was not published until Priestley went to live at Lord Shelburne's country house.

In the evening a second meeting, more largely attended, was held in the same hall. Mr. W. Sykes Ward presided, and Mr. S. Jefferson delivered a lecture on "The Discovery of Oxygen." This also was illustrated with experiments, in some of which Mr. A. A. Pearson assisted with the lime light.

Speaking of the great discoverer, the *Athenæum* remarks that the most memorable and deplorable incident of the famous Birmingham Riots, on the 14th of July, 1791, was the attack on Dr. Priestley, and the burning of his house and property, on account of his sympathy with the French Revolution. To-day all classes will unite in doing honour to him as a man who in politics only anticipated opinions that are now held openly by most people, and who, if his speculations and discoveries in science and philosophy were somewhat crude and incomplete, has rendered incalculable service to the progress of philosophic and scientific thought. When minister of Mill Hill Chapel, at Leeds, he began to attain eminence as a man of science, though for a long time previously he had been occupying himself profitably with scientific studies. He lived near a brewery, and that circumstance is supposed to have induced him to turn his attention to pneumatic chemistry, for the study of which it afforded certain facilities. At any rate, he there began the series of chemical discoveries on which his scientific fame chiefly rests. In 1772 he published a pamphlet on "Impregnating Water with Fixed Air," and also communicated to the Royal Society "Observations on Different Kinds of Air," which led to his obtaining the society's Copley medal. In 1774 he discovered "dephlogisticated air," or oxygen; and that was quickly followed by the discovery of other chemical elements and elemental compounds, of which the chief were nitrous gas, nitrous oxide gas, nitrous vapour, carbonic oxide gas, sulphurous oxide gas, fluoric acid gas, muriatic gas, and ammoniacal gas, as well as the pneumatic apparatus that is now in common use. By these exploits he may be said to have almost invented chemistry as a precise science. But he took a moderate estimate of his attainments therein. "Though I have made many discoveries in some branches of chemistry," he wrote, in 1795, "I never gave much attention to the common routine of it, and know but little of the common processes." While Priestley was at Leeds a curious incident occurred. It was proposed that Captain Cook's second voyage to the Southern Seas should be accompanied by a well-organized scientific expedition, under the direction of Sir Joseph Banks. Banks asked Priestley to join it as astronomer, and he acceded. Some weeks afterwards, however, Banks had to inform his friend that the appointment must be cancelled, as the Board of Longitude objected to his theology. It is not strange that on this occasion Priestley should have shown more indignation than was customary to his gentle nature. "What I am, and what they are, in respect of religion," he wrote to Banks, in December, 1771, "might easily have been known before the thing was proposed to me at all. Besides, I thought that this had been a business of philosophy, and not of divinity. If, however, this be the case, I shall hold the Board of Longitude in extreme contempt." So did other people. In 1773, Priestley left Leeds to be librarian and literary companion to the Earl of Shelburne, afterwards Marquis of Lansdowne. Financial reasons appear to have chiefly prompted this change, as by it he obtained a salary of £250 a year, to be followed by a pension of £150, instead of his meagre income of £100, terminable at the will of his congregation. It was useful, however, in other ways. He had access to good books and to congenial society, both in England and abroad. Either on account of his heresies, or for some other reason, Priestley parted from Lord Shelburne in 1780. Then began his residence in Birmingham, forming the most memorable decade in his career. "I consider my settlement at Birmingham," he wrote, "as the happiest event in my life, being highly favourable to every object I had in view, philosophical or theological. In the former respect, I had the convenience of good workmen of every kind, and the society of persons eminent for their knowledge of chemistry, especially Mr. Watt, Mr. Keir, and Dr. Withering. These, with Mr. Boulton and Dr. Darwin, Mr. Galton, and afterwards Mr. Johnson, of Kenilworth, and myself, dined together every month, calling ourselves the Lunar Society, because the time of our meeting was near the full moon, in order to have the benefit of its light in returning home." The Lunar Society is famous in the history of modern thought. It was the general character of this society and its members, doubtless, even more than their sympathy with the French Revolution, though that was the avowed cause of the exploit, that induced the High Churchmen and other great people of the town to incite the mob to the disgraceful riots that took place on the anniversary of the capture of the Bastille, in 1791, and of which Priestley was, in some respects, the chief victim. . . . The world of thought—theological, political, philosophical, and scientific—was torpid when Priestley began thinking for himself. It need not be strange to us that he sometimes thought amiss; the marvel is that he thought so well. Of course, in much he was only the creature of his time. He could not break all the bonds that surrounded him as well as others. Great outside forces were at work, which influenced him as well as others. But the bonds were, to a notable extent, broken, and the influences were wonderfully productive. He became a leader of independent thought in nearly all the channels of human progress, and we cannot be too grateful to him for the good work which he did, and for which but scant gratitude was accorded to him in his lifetime.

IMPERIAL GASLIGHT AND COKE COMPANY.

The Ordinary Half-Yearly General Meeting of the Proprietors of this Company was held at the Company's Offices, John Street, Bedford Row, on Friday, Aug. 7—Edward Vaughan Richards, Esq., Q.C., the governor, presiding.

The notice convening the meeting having been read, the corporate seal was affixed to the register of proprietors, and the following report and statements of account presented:—

The appeal made by your directors in January last for a revision of the price of the company's gas, under their Act of 1869, was, on the whole, successful. The commissioners appointed by the Board of Trade, after a thorough scrutiny, and notwithstanding the opposition of the Metropolitan Board of Works, adopted in the main the company's estimates, and authorized an increase of price during the year 1874, which they calculated would yield a dividend to the proprietors at the prescribed rates during that period, and make good the company's reserve-fund to the full amount to which that fund is limited.

The accounts of the company for the past half year are herewith submitted to the proprietors.

These accounts show that, notwithstanding the increase which the company have been authorized to make in their charge for gas, the net balance available for dividend is £26,583 short of the amount required for that purpose; which deficiency will have to be supplied from the reserve-fund.

This apparently unsatisfactory result of the working of the first half of the year requires explanation. The estimate submitted to the commissioners was carefully framed on calculations based on the probable results of the entire year. During the past six months—that is the first half of the entire year—no advantage whatever could be expected from any reduction in the price of coal, inasmuch as throughout the whole of those six months the high-priced contracts which your directors were compelled to accept last year have continued in existence. The costs incurred by the company attending the revision (which might properly be spread over the twelve months) are wholly charged in the accounts now submitted. And the prices obtained for coke have unfortunately fallen below the estimated rate, owing to circumstances beyond your directors control, and which, shortly after the hearing of the company's appeal, affected the London coke market generally to an unexpected extent.

In the current half year, however, the new contracts for coal promise a decided saving, so that your directors hope on the working of the whole year that the accounts in December next will show a surplus to be carried to the reserve-fund, instead of, as at present, a deficiency of balance for dividend.

Upon the result of the working of the current half year depends the question whether it will be necessary to make another appeal for a revision of price in January, 1875, as in the event of no application being then made, the charge for the company's gas will revert to the rate of 3s. 9d. per 1000 feet. It will afford great gratification to your directors if circumstances permit a return to this price, but they feel bound to be cautious in expressing any anticipations on the subject, as the possibility of reducing the charge for gas depends as much upon the returns to be realized for coke, as upon the amount to be paid for coal.

The expenditure of capital required at the Bromley works, in addition to the outlay for the extension of the purifying plant at all the stations, rendered necessary by the requirements of the gas referees with respect to the maximum quantity of sulphur in gas, together with the demand for additional mains constantly arising, make it necessary that the company should exercise the remainder of the borrowing powers authorized by their Act of 1869. The directors will therefore submit to the proprietors at the ensuing meeting a resolution authorizing them to raise by loan, under the security of the company's mortgage bonds, a sum not exceeding £81,250.

IMPERIAL GASLIGHT AND COKE COMPANY.

Statements of Account for the Half Year ending June 30, 1874.

No. 1.—STATEMENT OF STOCK AND SHARE CAPITAL, *on June 30, 1874.*

Acts of Parliament relating to the Raising of Capital.	Description of Capital.	Maximum Dividend authorized.	No. of Shares issued.	Nominal Amount of Shares.	Called up per Share.	Total paid up.	Arrears of Calls.	Remaining to be called up, and unissued.	Total Amount authorized.
17 Vict., cap. 55.	Stock.	10 per cent.	..	..	..	£1,560,000 0	..	..	£1,560,000
29 & 30 Vict., cap. 352. }	Share.	7 Ditto.	78,000	£12 10 0	£12 10 0	975,000 0	..	..	975,000
32 & 33 Vict., cap. 128. }			26,000	12 10 0	5 0 0	130,000 0	..	£195,000	325,000
						£2,665,000 0	..	£195,000	£2,860,000

No. 2.—STATEMENT OF LOAN CAPITAL, *on June 30, 1874.*

Acts of Parliament authorizing the Loan Capital.	Description of Loan.	Rates per Cent. of Interest.					Total Amount borrowed.	Remaining to be borrowed.	Total Amount authorized.
		4 per Cent.	4¼ per Cent.	4½ per Cent.	5 per Cent.	10 per Cent.			
29 & 30 Vict., cap. 352. }	Debentures	6,300	..	36,700	..	..	£43,000	..	£43,000
32 & 33 Vict., cap. 128. }	Ditto	..	92,000	151,600	150	..	243,750	£81,250	325,000
17 Vict., cap. 55.	Bonds for capitalized profits.	..	..	..	..	130,000	130,000	..	130,000
							£416,750	£81,250	£498,000

No. 3.—CAPITAL ACCOUNT.

To Expenditure, to Dec. 31, 1873		£2,764,903 19 11
Ditto during half year to June 30, 1874, viz.—		
Lands acquired, including law costs	£49 11 7	
New buildings and machinery in extension of works	101,748 8 10	
New and additional mains and services	5,834 19 7	
		107,633 0 6
Total expenditure		£2,872,536 19 11
Balance		209,213 0 1
		£3,081,750 0 0

	Certified Receipts to Dec. 31, 1873.	Received since that date.	Total Receipts to June 30, 1874.
By Consolidated Stock (1871)	£1,560,000 0 0	..	£1,560,000 0 0
£12 10s. Shares (1866)	325,000 0 0	..	325,000 0 0
£12 10s. ditto (1870)	325,000 0 0	..	325,000 0 0
£12 10s. ditto (1872)	325,000 0 0	..	325,000 0 0
£12 10s. ditto (1873)	120,665 0 0	£9,335 0 0	130,000 0 0
	£2,655,665 0 0	£9,335 0 0	£2,665,000 0 0
Bonds for capitalized profit	130,000 0 0	..	130,000 0 0
Debentures	286,750 0 0	..	286,750 0 0
	£3,072,415 0 0	£9,335 0 0	£3,081,750 0 0

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—			
Coals, including dues, carriage, unloading, and trimming (see account No. 8)	£279,354 7 5		
Salaries of engineers, superintendents, and other officers at works	2,667 18 0		
Wages (carbonizing)	30,552 2 0		
Purification, including £3567 6s. 6d. for labour	11,327 9 3		
Repairs and maintenance of works and plant, materials, and labour—less £1182 0s. 7d., received for old materials	35,293 11 9		
		£359,195 8 5	
Distribution—			
Salaries and wages of officers (including rental clerks)	7,415 15 10		
Repairs, maintenance, and renewals of mains and service-pipes, including labour	4,965 1 9		
Repairs and renewals of meters	5,949 1 2		
		18,329 18 9	
Public lamps—			
Lighting and repairing		7,144 5 0	
Rents, rates, and taxes—			
Rents payable	1,953 1 7		
Rates and taxes	7,236 5 4		
		9,189 6 11	
Management—			
Directors allowance	2,000 0 0		
Company's auditors	105 0 0		
Salaries of secretary, accountant, and clerks	3,862 1 0		
Collectors commission	5,321 3 8		
Stationery and printing	2,061 10 3		
General charges	941 7 5		
		14,291 2 4	
Law charges		117 2 6	
Bad debts		1,842 11 9	
Public officers—			
Gas referees and official auditor	172 14 2		
Public testing-stations	5 3 9		
Revision charges (estimated)	2,437 13 0		
		2,615 10 11	
Total expenditure		412,725 6 7	
Balance, carried to net revenue account (No. 5)		102,854 13 1	
		£515,579 19 8	

By Sale of gas—			
Common gas, per meter, at 4s. 8d. per 1000 cubic feet	£371,800 1 7		
Public lighting and under contracts, common gas (See statement No. 10.)	47,823 5 1		
		£419,623 6 8	
Rental of meters		8,210 4 11	
Residual products—			
Coke, less £7762 9s. 1d. for labour and cartage	64,325 8 4		
Breeze, less £1795 11s. 6d. for ditto	6 1 9		
Tar	12,967 3 0		
Ammoniacal liquor	9,546 15 2		
		86,845 8 3	
Rents receivable		843 12 4	
Transfer fees		57 7 6	
		£515,579 19 8	

No. 5.—PROFIT AND LOSS (NET REVENUE) ACCOUNT.

To Interest on debentures and bonds, to June 30, 1874		£12,759 4 9
Ditto on temporary loans, &c.		815 17 9
Balance, applicable to dividend on ordinary share capital		90,091 17 1
		£103,666 19 7

By Balance from last account		£69,162 15 5
Amount drawn from reserve-fund		41,646 14 9
		110,809 10 2
Less dividend on ordinary capital for half year ending Dec. 31, 1873		110,809 10 2
Amount from Revenue Account (No. 4)		102,854 13 1
Interest on calls in arrear		10 3 2
Dividend on contingency-fund		802 3 4
		£103,666 19 7

No. 6.—RESERVE-FUND.

To Profit and Loss Account to make up deficiency for dividend in previous half year		£41,646 14 9
Balance on June 30, 1874		27,512 18 9
		£69,159 13 6

By Balance on Dec. 31, 1873		£68,712 0 9
Interest on amount invested		447 12 9
		£69,159 13 6

No. 7.—CONTINGENCY-FUND.

To Balance on June 30, 1874	£50,000 0 0	By Balance on Dec. 31, 1873 £50,000 0 0

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1873.	Received during the Half Year.	Carbonized during the Half Year.	Used for Sundries during the Half Year.	In Store, June 30, 1874.
	Tons.	Tons.	Tons.	Tons.	Tons.
Newcastle	33,556	199,710	203,001	775	29,490
Cannel	4,622	8,197	3,993	..	8,826
	38,178	207,907	206,994	775	38,316

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, Dec. 31, 1873.	Made during the Half Year. Estimated.	Used during the Half Year. Estimated.	Sold during the Half Year.	In Store, June 30, 1874.
Coke—chaldrons of 36 bushels	32,113	206,992	64,737	127,958	46,410
Breeze—ditto	2,173	25,935	..	27,055	1,053
Tar—Gallons	231,498	1,774,176	..	1,841,385	164,289
Ammoniacal liquor—butts of 108 gallons.	3,795	37,262	..	37,328	3,729

No. 10.—STATEMENT OF GAS MADE, SOLD, Etc.

Description of Gas.	Quantity Made. Estimated.	Quantity Sold.			Quantity used on Works, &c.	Total Quantity Accounted for.	Quantity not Accounted for.	Number of Public Lamps.
		Public Lights, and under Contracts. Estimated.	Private Lights, per Meter.	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	1,949,383	174,339	1,593,429	1,767,768	26,303	1,794,071	155,312	16,868

No. 11.—BALANCE-SHEET.

To Capital—				**By Cash at bankers**		£68,308 15 6
For balance, per account (No. 3)	£209,213 0 1			Amount invested in Three per Cent. Consols—		
Net revenue—				Reserved fund	£27,065 6 0	
For balance, per account (No. 5)	90,091 17 1			Contingency-fund	50,000 0 0	
Reserved fund, for balance, per account (No. 6)	27,512 18 9					77,065 6 0
Contingency-fund, ditto (No. 7)	50,000 0 0			Stores on hand, viz.—		
Debenture interest, for amount due to June 30, 1874	5,921 11 5			Coals	58,573 17 4	
Bond interest, ditto ditto	6,500 0 0			Coke and breeze	21,080 10 8	
Sundry tradesmen and others, for amount due for coals, stores, and sundries	60,404 7 10			Tar and ammoniacal liquor	1,444 16 7	
				Sundry stores	35,903 7 7	
						117,002 14 2
				Accounts due to the company—		
				Gas and meter rental, quarter ending June 30, 1874	160,004 18 1	
				Gas and meter rental, arrears outstanding	8,098 18 1	
						168,103 16 2
				For coke and other residual products		6,372 7 1
				Sundries		12,790 16 3
	£449,643 15 2					£449,643 15 2

The GOVERNOR: I confess, gentlemen, to a considerable feeling of disappointment when I first saw the accounts which are now submitted to you. I had, of course, carefully watched our coke sales during the early part of the year, and had become gradually aware that the produce of those sales was likely to fall considerably short of what we had been sanguine enough to anticipate would be the case. But I was not, I honestly confess, prepared to find that on the result of the half year's working we should have to take £26,583 from our reserve-fund, in order to make up our dividends, leaving to the credit of that fund less than £1000. But, gentlemen, when I came to look more carefully into the accounts, with the aid of a little reflection, I thought I saw a satisfactory explanation of the past, and something to reassure me for the future. And I cannot help thinking that a brief review of our actual position will tend to reassure your minds, as it has done my own, and to remove any tendency to uneasiness which you might otherwise be disposed to feel. In the month of January last we went before the Revision Commissioners appointed by the Board of Trade, and obtained from them, as you are aware, an additional price of 11d. per 1000 cubic feet for our gas, which, according to their calculation, was likely to yield us £165,000 upon the year. Of course, as in duty bound, we submitted to the commissioners the most accurate calculations which we could, with the materials at hand, to enable them to form a judgment with reference to the probable working of 1874. I need hardly say that the two principal items in our calculations were the price which we should have to pay for our coal and the receipts we were likely to obtain for our coke. The two half years differ in this respect; for the first half year the price of our coal was absolutely fixed and ascertained, being determined by the contracts which we made in 1873. The price of coke, on the other hand, was fluctuating and speculative—mere guess work. The only thing we could do was to form the best opinion in our power, under the circumstances, as to what we were likely to get for our coke in the first six months. You will perceive that, with a fixed price for coal, and that necessarily high, because ruled by the prices which prevailed in 1873, the only margin we could not rely upon, the only item susceptible of fluctuation was our coke, and I am sorry to say we are very much disappointed in the sales of that article. We calculated, for the purpose of our case before the commissioners, that we should obtain an average of 12s. 6d. per chaldron in the half year; we have, in point of fact, only netted 10s., and that, I am sorry to say, shows a deficiency in the coke receipts, as compared with the corresponding period of 1873, when very high prices were obtained for coke, of no less than £47,000. Now that is a circumstance which, when I have explained how it arose, I think you will at once say was entirely beyond our control. On the other hand, we had to pay for coals a greater sum than we paid in the corresponding period of 1873 of no less than £53,000. These two items make a total of £100,000. The extra 11d., which the commissioners conceded to us, added to our increase of business, produced a rental in the half year, in excess of the corresponding period of 1873, of £96,000. Thereby you perceive that, notwithstanding the excess of rental, we were to the bad, from the extra price of coal and the deficiency in the coke, by just £4000. Now, I think you have a perfect right to say, "How came it that you directors, with the knowledge you ought to have acquired, made so great a mistake as to estimate your probable receipts for coke at 12s. 6d. per chaldron before the commissioners, whereas, in point of fact, you only realized 10s.?" We took the average of the prices we had obtained for coke during four previous years, and finding that that average bore a certain per centage on the price we then paid for coal, we adopted that per centage for our estimate. Our expectations have, however, been disappointed. The months of January, February, and March were almost unprecedented for mildness, and that mild character of the weather was much calculated to check the sale of coke. It operated so much upon one of the contractors for coke with the Chartered Company that at this period he threw up his contract, and paid a forfeit to them for so doing. The result of this was to throw some 50,000 or 60,000 chaldrons of coke upon a market already considerably glutted in consequence of the falling off of the demand for this article. Under these circumstances we have found ourselves unable to obtain more than 10s., instead of 12s. 6d., and I think that these statements fairly explain the position of things for the past half year. In submitting our estimates to the commissioners for the second half year, we had, of course, as far as the stock of coal was concerned, to calculate still a fixed price for all that was carried over from the 30th of June, but in the remainder of the year we had two uncertain items to deal with—first, the price of coals not then ascertained, and which we were then obliged to guess at; and, secondly, the price of coke fluctuating just in the same way as in the previous six months. We submitted a certain price to the commissioners as probably that which we should have to pay for our coal, and I am happy to tell you that we have obtained some at a less price than we calculated. We have now, for our own satisfaction and for your information, entered into a second calculation, and have taken the probable price of coke, not at 12s. 6d., as we did erroneously before the commissioners, but at 10s., the price actually received. The result of this calculation shows that in all probability (of course, I speak with all due reserve), we shall have, after paying full dividends for the current half year, a surplus on the 31st of December next of from £30,000 to £40,000. Of course, I cannot speak confidently, but I am strongly inclined to think that this will be the state of affairs. If our coke does not realize all that we expect, as 6d. per chaldron represents £3000—supposing we only realize 9s. 6d. instead of 10s.—of course, there will be a reduction of £3000 from our estimate. This, gentlemen, is the best sketch I can give you of the present and future. I hope I have given you a fair representation of the past; and, though we did make the mistake of taking a higher price for our coke than we afterwards realized, I do not think it was other than a reasonable calculation at the time. Our great object was to submit to the commissioners such calculations as we could honestly support; not to overrate our receipts for coke, nor to underrate the price of coal. I need not say that there were many engineers present knowing nothing about the matter, and caring only to please their clients, who were prepared to show that we should get 13s. 6d. or 14s. for our coke. Now, gentlemen, upon this question of our circumstances at the end of the year depends whether we shall or shall not be compelled to go for a revision of the price of gas in January next, for, as you are aware, the price which we are now permitted to charge only extends over the year 1874. I can only say that if it can possibly be avoided there is no body of men who would rejoice more than your directors; but, if from circumstances which we cannot foresee or provide against, we are compelled to go again before the commissioners, we shall be prepared to exercise those legal rights which the Act of 1869 confers upon us. And this brings me to a consideration of another subject—namely, the proceedings of the Metropolitan Board of Works. You are aware that a sub-committee of that board have lately presented a report to the board at large on the gas supply of the metropolis, in which they recommend that, in consequence of the conduct of the gas companies, the board shall start an opposition, and supply the metropolis with gas in competition with the existing companies. The report was presented at the last meeting, and Mr. Newton, an eminent member, and one or two others, made some observations in support of it. Now those gentlemen know perfectly well that no municipal authority has ever yet been permitted by Parliament to trade upon the public rates in competition with any company who have invested their capital upon the authority of the Legislature. The thing

has been attempted over and over again, and in every single case Parliament has required the municipal authority to buy up the authorized company at a fair price. If the Metropolitan Board of Works are prepared to buy up this company at a proper price, I have no more to say; but if they think they are to trade upon the rates, and tax the public at large, and not only so, but the gas companies themselves—for we are considerable ratepayers—and to enter into competition with us, I can only tell them that it would be the first time that Parliament ever authorized such a procedure, and that if Parliament is prepared to stand by the precedents hitherto guiding it, they are not likely to obtain such an authority. Indeed, I think, from the remarks of Mr. Newton and a Mr. Richardson, that they hardly think it probable their application would be successful. But they seem to think that the threat of such an application will be sufficient to frighten the gas companies into an assent to take 6 per cent. on their investments, instead of their present authorized dividends; but, you know, if you want to frighten a bumpkin, you ought not to let him see the turnip scooped out and the lighted candle put inside—it deprives the bogey of half its terrors. It amuses me to think that these gentlemen should suppose that their threat of going for a bill would frighten us out of rights which Parliament, after careful consideration, has from time to time conceded to us. Mr. Newton says their proposition is a carrying out of the suggestion of Mr. Cardwell, when chairman of the committee on the Metropolis Gas Bill, in 1867. I do not know whether Mr. Newton thinks that what he says is correct, or whether he is taking advantage of the want of intelligence in those whom he addresses; but I must tell him that he is altogether mistaken. What Mr. Cardwell then said was this: "Unless you, the Chartered Company, will accept certain terms, we will recommend that the corporation of the City of London have authority to start gas-works in opposition to you." The Chartered Company did accept those terms, thinking to protect themselves from the competition of the City. In 1869 we also accepted terms almost identical, and we are therefore entitled to consider ourselves as equally protected.

Mr. ST. GEORGE BURKE: Accepted them at the instance of the Metropolitan Board.

The GOVERNOR: Just so; and then observe, the corporation are an altogether different body to the Metropolitan Board. They have property of their own, upon which they could start the thing; they have also the control of the streets and the sewers, and, in fact, the entire management of the City, barring some small details; for the parochial authorities, in their jurisdiction, are little more than guardians of the poor. The Metropolitan Board occupy a very different position. The vestries of the great parishes of St. Marylebone, St. Pancras, Paddington, and three or four others, are bodies controlling their own streets and managing their own large funds, and are very little likely to wish to be placed under the thumb of the Metropolitan Board. Moreover, the board know perfectly well that they do not possess the confidence of the public, or any section of the public, to induce them to entrust in their hands the manufacture of gas for the metropolis. I really think, considering the absolute want of success which the board met with in the late session of Parliament, they ought to be more cautious how they introduce a bill of this sort. However, if the time comes that they do introduce it, we shall be prepared to meet them, and I think we shall be able to answer some of the arguments which Mr. Newton and other gentlemen have addressed to the board. They talk incessantly about our dividend, and call it 10 per cent. Of course, to take the largest dividend we receive, and apply it to all our capital, makes us more unpopular; but, in truth, our dividend is not 10 per cent. Taking our maximum of 7 per cent. on £1,105,000, reduces our average dividend to 8½ per cent., and they are good enough to say that if we will take 6 per cent. upon our whole capital—which would be simple confiscation of property to that extent, the authority of Parliament having been given to it—they will condescend to withdraw their bill—for the present. They seem to think that whenever circumstances tell at all against them they are to start a little fresh legislation on their own account. They say, moreover, that the Acts of 1868 and 1869 established 3s. 9d. as the maximum price. These Acts of Parliament did nothing of the sort. They simply fixed it as the price at that time, and by introducing the provisions for periodical revision, Mr. Cardwell distinctly pointed out, as it was repeatedly pointed out during the discussions, that it was intended there should be power to obtain an altered price when such an alteration was called for by a change of circumstances. What could be more unreasonable than to suppose that a company could continue to supply gas at the same price when coals are at 28s. as when they are at 16s. I do not know whether I ought to take any notice of the matter, but I see by the report of the proceedings at the Metropolitan Board that Mr. Newton, when attacking our conduct before the Revision Commissioners, says, "The governor of the Imperial Company was very minutely examined upon this transaction (that is, the conversion of debentures into share capital), by Mr. Cripps, the counsel for the board, and the only answer he condescended to make was, 'I am a director of the company, and my duty is to attend to the shareholders. I represent their interests, and I have to see that the company are properly protected.' That was all he condescended to say. This plainly showed that the interests of the consumers were not considered by him, and therefore it was that some more efficient control was needed to see whether 'due care and management' was exercised over the affairs of the companies." I do not know whether Mr. Newton cares to know that Mr. Cripps never asked me a single question, and that the transaction referred to was never alluded to in my cross-examination; therefore, I could not have given the answer which he says I gave, nor did any one else, as far as I can learn. I do not know whether this is a sample of Mr. Newton's accuracy, or whether he would think a statement of this sort disproved would be material or not. There is only one other thing, gentlemen, upon which I need detain you with a remark. I may tell you that though we have not yet decided upon the matter, it is upon the cards that in the next session of Parliament we may have to go for additional capital. The expenditure at Bromley has been extremely heavy, and I expect we shall find ourselves with a very small amount of capital left at the beginning of next year, so that I cannot help thinking we shall have to ask for an addition in the session of 1875. It is not absolutely fixed upon, but I felt I should not have done my duty in dealing with you, if I had not mentioned the possibility and even the strong probability of the thing. I shall be extremely happy to answer any question that may be proposed to me, and I conclude by moving,—"That the report and accounts now read be approved, and entered on the minutes."

The DEPUTY-GOVERNOR (Mr. Barclay Farquharson Watson) seconded the motion.

Sir A. BRADY: I, for one, as the director of another company, congratulate you, sir, upon the statement you have just made to the meeting as to the state of the coke market, and, in corroboration of your remarks, I may say that your experience is that of other large companies. The present meeting will, I am sure, amply justify you in stating that, though before the commissioners, you estimated the returns from coke at 12s. 6d., you could only obtain 10s. per chaldron. It has arisen from one of those vicissitudes of trade over which you and your colleagues could have no possible control. I am sure that for the future we shall look at your estimates with the same confidence we have always done, knowing that you would never put forward a statement which you were not abundantly justified in making. By the remarks you have just made, you have added to the confidence of the present proprietors in your able management of this great company. There is only one question I wish to ask, and that has reference to the paragraph in the report in which you say you are going to take power to raise £81,250 on mortgage bonds. I see in account No. 1 that you have £195,000 remaining to be called up and unissued. Have you any intention of making use of that capital? I think if you were to offer it to the present proprietors at par it would all be subscribed.

The GOVERNOR: It was all issued long ago. The word "unissued" should be struck out of that heading; but I beg you to understand that we are not at all responsible for this form of accounts. The accounts prepared in this form on the highest authority; we have only to fill up the items. It is a general form of accounts supplied to several companies, some of whom may have "uncalled" capital, and some "unissued." We have none of the latter. This £195,000 remained to be called up on the 30th of June, but since then £65,000 has been called. We are extremely anxious not to call up more money than we actually require, because we have no wish to lay an additional tax upon the public in the shape of dividend. The balance of £130,000 we shall, of course, call up whenever needful; but I confess I hope we may stave off the necessity a little longer. Upon these matters necessarily depends the question whether we shall have to go to Parliament for additional capital next year.

The motion for the adoption of the report was put, and carried unanimously.

The GOVERNOR then moved—"That the following dividends be now declared, for the half year ending the 30th of June last—viz., at the rate of 10 per cent. per annum on £1,560,000 consolidated stock; at the rate of 7 per cent. per annum on 78,000 £12 10s. shares, fully paid up, and on 26,000 £12 10s. shares £5 per share paid; and that the dividends as above be made payable on Tuesday, the 1st of September next."

Mr. ST. GEORGE BURKE seconded the motion, which was put and agreed to.

The GOVERNOR: We have now upon the last issue of shares such an amount paid up as entitles us to raise money by debentures, and we think it extremely desirable to take power to raise in that way an amount not exceeding £81,250. When we were before the commissioners, the cross-examination of our witnesses was directed to the question how far we had raised our money at the cheapest possible terms, and it was asserted to be outrageous that we had not raised our share capital by 6 per cent. preference rather than 7 per cent. ordinary stock, which, it was suggested, in the interests of the public, we were bound to do. We can, of course, raise money more cheaply by debentures than any other way, and we propose to do it, with your permission. I, therefore, move—"That the directors be, and they are hereby authorized to borrow, under the powers conferred upon the company by the Imperial Gas Act, 1869, any further sums of money, not exceeding in the whole £81,250, in addition to the sum of £162,500 already authorized to be borrowed under the powers of the above Act, at such times and at such rates of interest as the directors may deem desirable."

The DEPUTY-GOVERNOR seconded the motion, which was carried *nem. dis.*

The GOVERNOR: I am happy to say, gentlemen, that is all our business to-day. I hope when we meet again we shall have a more satisfactory state of accounts to present. At the same time, I do most earnestly assure you that the existing state of things has not arisen from any neglect on our parts, but from circumstances over which we had no control—the entire depreciation of the coke market—an event the effects of which are not peculiar to ourselves.

Sir A. BRADY: Gentlemen, I am sure every person in this room will be pleased to concur in a very cordial vote of thanks to the governor and board of directors for their continued attention to our interests, and in the expression of our unbounded confidence in the wisdom and energy of their management. They have had a difficult part to play, and I know that other directors have had the same difficulty, and some of them have not been able to get even so much for their coke. I think it reflects great credit upon our board that they have done so well as they have.

Mr. BOODLE seconded the vote, which was heartily responded to.

The GOVERNOR: Gentlemen, in the name of my colleagues, and in my own, I thank you sincerely for this compliment. When we come before you with a flourishing state of finances, are able to pay you full dividends, and have a good balance over, we take your complimentary remarks somewhat as a matter of course. On the present occasion you give us credit for earnestness in our work, and do not turn round upon us with reproaches because we are not so prosperous as in former years, and as I hope we may be again. I thank you for the sympathy shown towards us at a period which, I confess, has been an anxious and trying one. Your appreciation of our services will be a strong stimulus to continue those exertions which we have ever been ready to bestow upon your concern.

The proceedings then terminated.

METROPOLIS GAS SUPPLY.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone during the month of July:—

—	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrog.
	*Mean of 23 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Imperial Comp.'s gas	16·44	17·61	15·80	22·20	8·00	18·30	0·80	No trace
CharteredCompany's common gas	16·73	17·54	15·87	31·26	14·04	11·76	0·66	No trace
CharteredCompany's cannel gas	20·82	21·81	20·00	25·89	12·30	16·96	0·96	No trace

Mean of daily readings of barometer . . . 29·82
" " " thermometer . . . 71·2

* Each observation consists of ten readings of the photometer, at intervals of one minute.

The mean illuminating power of the Imperial Company's gas during the month was equal to the light of about 16½ sperm candles; it ranged between 15·80 and 17·61 candles, it therefore is apparent that on no occasion did it fall below 1·80 candles in excess of the legal standard. On four occasions it exceeded 17 candles. The mean quantity of sulphur found in 100 cubic feet of this gas was 18·30 grains, and of ammonia 0·80 of a grain. The mean light of the Chartered Company's common gas was equal to 16¾ candles; it ranged between 15·87 and 17·54 candles; four times it exceeded 17 candles. The mean amount of sulphur contained in it was 11·76 grains, and of ammonia 0·66 of a grain. The mean light of the cannel gas was equal to 20·82 candles; it ranged between 20·0 and 21·81 candles. The mean amount of sulphur contained in it was 16·96 grains, and of ammonia 0·63 of a grain. The pressure of all the gases was fair, and on no occasion was sulphuretted hydrogen detected in either of them by the usual tests. The above results were obtained from the gas manufactured by the Imperial Company at their Fulham works, and from the Chartered Company's gas manufactured at their works, Beckton and Bow.

LAMBETH.—A public meeting was held in the vestry-hall on Wednesday evening last, "in support of a plan recently submitted to the Board of Trade, whereby the present grievances of gas consumers can be equitably and substantially redressed." Mr. F. H. Fowler presided; and Mr. Norwood Earle was heard at some length upon the scheme which he, when acting as spokesman for a deputation, laid before Sir Charles Adderley in the month of June last. The meeting, however, was not favourable to the suggestions, and, by a large majority, a preference was expressed for the course of action proposed by the Metropolitan Board.

METROPOLIS WATER SUPPLY.

Dr. Whitmore's report on the composition of the Thames companies and other waters as supplied in Marylebone during the month of July:—

—	Total Solid Matter in degrees or grains per Imperial gallon.		* Loss by incineration of Solid Matter in previous column.		Hardness before boiling in degrees.	Hardness after boiling in degrees.
	July, 1873.	July, 1874.	July, 1873.	July, 1874.		
Distilled Water . . .	0°	0°	0°	0°	0°	0°
West Middlesex water .	18·69	17·0	0·78	0·76	12·98	2·92
Grand Junction water. .	18·76	15·84	0·76	0·72	11·76	2·59

* The loss by incineration represents the amount of organic and other volatile matters contained in an Imperial gallon (70,000 grains) of water.

During the month the water supplied to the parish by both the West Middlesex and Grand Junction Companies has been bright, clear, and well filtered, and the quantity of total solid as well as organic matter found unusually small. To a great extent this has been due to the dry weather.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

(*Continued from page* 167.)

In the evening Dr. WALLACE, F.R.S.E., F.C.S., gas examiner for the city, delivered a lecture on "The Influence of Pressure on the Illuminating Power of Gas, and on a New System of Photometry for Coal Gas." The lecturer, who was listened to with deep attention, detailed his experiments with various descriptions of gas-burners, tested at different pressures, and with different qualities of gas, and described his new system of photometry (a brief notice of which was published recently in the JOURNAL OF GAS LIGHTING), by which the quality is ascertained by comparing two jets of the same gas consuming equal quantities, but burning at different pressures. A meter for obtaining exactly equal quantities of gas by means of two drums fixed upon the same spindle, and made expressly for this system of photometry by D. B. Peebles and Co., was exhibited in action. The new "Silber Argand" burner was also exhibited and described, and a great variety of Argand, bat's-wing, and union burners were shown, and the principles of their construction illustrated. Dr. Wallace showed his improved photometer sight-box with stereoscopic lenses, by which the difficulty arising from the diversity in the colour in two flames is entirely obviated, and referred to some experiments on the absorption of light by red and green glass (as used in signal lamps) which could not have been made satisfactorily by the ordinary photometer.

After a few complimentary remarks by the president, Mr. Hislop, of Paisley, and others, a cordial vote of thanks was awarded to Dr. Wallace for his interesting and instructive lecture. The president then declared the proceedings closed, and announced that the next annual meeting would be held at Dundee on July 11, 1875.

GASLIGHT ASSOCIATION OF THE UNITED STATES.

MEETING AT CLEVELAND, OHIO, WEDNESDAY, MAY 13.

(*Continued from page* 129.)

The SECRETARY (Mr. De Witt) read a paper, by Mr. W. H. Grenelle, on

GIBSON'S COMBINED VALVE AND DIP-PIPE.

The paper set forth that the invention, which was patented in the United States, consisted in introducing one or more valves or cut-offs, at any convenient point between the gas-producing materials in the retort and the liquid contents of the hydraulic main, providing two outlets for the gas from the retort, one by a dip-pipe and the other by a free passage, capable of being closed by a valve or cut-off, sealing and unsealing the dip-pipe by a mechanical device introduced below the water-line in the hydraulic main, combined with an automatic attachment preventing the removal of the lids of retorts until the seal is restored; also in combining a number of stand-pipes under one valve, an improved hydraulic main that seals and unseals dip-pipes, by raising and lowering the liquid contents of the hydraulic main, without the use of water.

Gibson's process, preventing the formation of hard carbon in the retorts, by relieving them from pressure during the manufacture of illuminating gas, and controlling and regulating the production of gas from ordinary caking coals, at a fixed standard of illuminating power, has been applied during the past six months to the Cambridge Gas-Works, at Cambridgeport, Mass.; at People's Works, Brooklyn, New York; and at People's Works, Albany, New York, with satisfactory results.

The record at the new gas-works at Cambridgeport, Mass., is, of course, more advantageous to the valves than that of less modern gas apparatus, and therefore these works are not quoted, except as a reference for preservation from carbon in the retorts, and for a general statement of yield per pound of coal used and cubic feet of gas per retort charged.

Gibson's combined valve and dip-pipe was first applied at the People's Works, Brooklyn, N.Y., on the 10th day of November, 1873; the works were altered from dip-pipe seal very gradually, and without any interference in the ordinary working of the retorts, save that a charge was missed during the hour taken to adjust the valve; the facility of application enabling the substitution to be made without the employment of extra labour. On the 29th of November, 1873, four retorts in a bench of fives were fitted with valves, the other left in old dip-pipe seal of 1¼ inch; the retorts were new, 8 feet 6 inches by 12 inches by 20 inches, and charged continuously until Feb. 5, 1874, with from 1000 lbs. to 1050 lbs. of Penn or Westmoreland coals to the bench each four hours, until the retort in dip was unable to do its share of the work, from formation of hard carbon, while the others remained free from such accumulation. The only appearance of deposit in the retorts is a scale slow of formation and easily detached, leaving the retort entirely clean. A specimen of this scale is herewith presented for inspection; its designation by the School of Mines, Columbia College, New York, is "*Papyrocarbon.*"

The design of Gibson's invention is to retain the dip-pipe seal at all times, and to make use of the valve only when most advantageous to do so; after a retort has been charged, for a moment or two the action of the dip-pipe seal is used, to show that the luting, the joints, and the retorts are free from imperfections; then the valve is opened, and the exhauster retained at vacuo on the hydraulic main for the first three hours; during the last hour the illuminating power of the gas in the retort having fallen below the standard, the valve is closed, to enable the production during the last hour to receive the benefit of the dip-pipe seal. When a retort becomes defective during the time of production, the tell-tale in the retort-house gives the warning; the imperfect retort can easily be discovered and the remedy applied, without disturbing the production of any other retort.

During December, 1873, and January, 1874, special comparative tests were made at the People's Works in Brooklyn, N.Y., by experts, for the purpose of ascertaining the actual increase of yield and candle power; the ordinary working during the entire month of February, 1874, was also carefully noted and compared with the production by same benches in February, 1873, under supervision of the same engineer, the average result has been to demonstrate an actual gain, in the comparative make and sales, of more than 10 per cent. of equal illuminating power.

At the People's Works at Albany, N.Y., the facility of application was more apparent, two-thirds of the retorts in use having been fitted up in ten consecutive hours; the average yield to date, as compared with the average yield in dip-pipe seal during the past year, being more than 9 per cent. in favour of the valves.

When the valves are used to aid in the joint manufacture of coal gas and naphtha, the yield from coal of fixed gas can be increased 30 per cent. above the maximum by dip-pipe seal.

This valve, by preventing the formation of carbon, adds about 10 per cent. per annum to the capacity of production from retort; to this add the increase of yield per pound of coal carbonized, and gas-works thus fitted will be enabled to meet an increased demand without addition to plant. Where the works are fully equal to the demand, the gain is represented by the decrease in the coal used, the less number of retorts required, the reduction in labour, and the addition to the life of the retorts.

Mr. CRUSE (Cleveland) read the following paper on

GAS PURIFICATION.

The purification of the gas after its condensation and washing is principally effected by the use of caustic lime or oxide of iron.

The impurities consist of sulphuret of hydrogen, sulphurous acid, bisulphide of carbon, cyanogen and different cyanides, carbonic acid, and ammonia.

Caustic lime, as well as oxide of iron, are very effective agents upon nearly all of these impurities.

The caustic lime readily absorbs the sulphur of the sulphuretted hydrogen, forming sulphide of lime, neutralizes the sulphurous and carbonic acid, and forms with the cyanogen and the cyanides, cyanide of lime. The lime, however, has no effect upon the carbonate of ammonia. But this impurity ought to be removed from the gas by washing in the scrubber, and only the last traces of it pass over to the purifying-boxes, where the moisture of the lime will, of course, absorb some ammonia, but only very little at best.

The bisulphide of carbon will not be decomposed or absorbed by the lime, but passes through all the purifiers and remains in the gas.

The oxide of iron, as a purifier, will absorb the sulphur of the sulphuretted hydrogen, forming sulphide of iron; will neutralize the sulphurous acids and decompose the different cyanides. The carbonate of ammonia will be decomposed, and the last traces of ammonia are removed from the gas by this purifier. But the oxide of iron has no effect whatever upon the carbonic acid, and, as the lime, none upon the bisulphide of carbon.

The bisulphide of carbon, which forms a considerable impurity of the gas, will not be removed by either of these purifiers, and there exists actually no practical way for removing it. But in those gas-works where the ammoniacal liquor is utilized and the water from the hydraulic main used for washing the gas in the scrubber, the bisulphide of carbon is dissolved in the ammoniacal liquor, and does not pass over to the purifying-boxes at all.

Comparing the effect of the lime and of the oxide of iron, we find that they are about equally effective upon the sulphides and cyanides in the gas.

The ammonia is not absorbed by the lime, but by the iron, and the carbonic acid is not affected by the iron, but absorbed by the lime, and both are equally uneffective upon the bisulphide of carbon.

The lime, after its power is exhausted, becomes useless, and causes only expense for removing, and trouble on account of its obnoxious smell and the poisonous gas which it exhales.

The oxide of iron, after being removed from the boxes, undergoes a revivification by the mere exposition to the air, and is soon ready to be used again. The chemical process is simply this. The sulphur from the sulphuret of hydrogen is combined with the iron to form sulphide of iron, which is a very changeable compound. If exposed to the air, one-third of the sulphur will be set free; and the other two-thirds will be transformed into sulphate of iron, or copperas, merely by the absorption of oxygen from the air.

In this way the exhausted oxide of iron, after being exposed to the air and decomposed by the oxygen, is brought back to the boxes as a mixture of oxide of iron and copperas, and it is by the copperas that the ammonia of the gas is absorbed. The sulphuric acid of the copperas forms sulphate of ammonia, and sets the oxide of iron free to absorb sulphur again from the sulphides in the gas.

The purifying power of oxide of iron, will last a very long time, and only be limited by the accumulation of sulphur. As said before, one-third of the sulphur is set free at every revivification, and this sulphur accumulates in the mass, so that in a very long time it can amount to 60 per cent. of the whole.

Iron and lime are both very good purifiers, but the lime can only be used once, and is thus practically very expensive. The iron can be used over and over again, but does not affect the carbonic acid in the gas, and has, if used alone, another considerable disadvantage; that is, the oxide of iron will not very readily absorb the sulphur from the sulphuret of hydrogen if the whole mass is not in an alkaline, or at least neutral, condition.

The copperas is a very unsteady and changeable combination, and there is always great danger that the neutral condition of the mass will be changed into an acid one, and in this way diminish the absorbing power of the oxide of iron for sulphides.

This fact accounts for the very irregular results which are obtained by the use of oxide of iron as a purifier, and has led to the use of the well-known combination of Laming's mass, who first used oxide of iron and caustic lime together.

A very good way to prepare Laming's mixture is this: Take equal weights of caustic lime and sawdust, and mix them thoroughly. For this purpose the lime ought to be sifted, in order to keep all the lumps back, and use only the fine dust. Then put in the same weight as the lime or sawdust of copperas, dissolved in water, and expose it to the air for at least 24 hours. If the copperas is dissolved in boiling water, the whole amount can be mixed at once; if not, it must be done in smaller portions, waiting till the solution is absorbed by the sawdust and lime.

In this way the purifier consists of equal weights each of sawdust, copperas, and lime. After it is mixed the caustic lime will decompose the copperas and form sulphate of lime, the protoxide of iron of the copperas will absorb oxygen from the air, and form a very finely divided mass of oxide of iron. This can be observed by the brown colour which the whole mass assumes.

Copperas needs only one-fifth of its weight of lime for this decomposition. Laming's mass ready for use consists of a mixture of oxide of iron, sulphate of lime, and a large excess of caustic lime.

The gas passing through this mass will give its sulphur to the oxide of iron, the sulphate of lime will absorb the last traces of carbonate of ammonia, forming sulphate of ammonia and carbonate of lime. The caustic lime will absorb the free acids. But the principal effect of the presence of lime is the alkaline or at least neutral condition of the whole mass, without which the absorption of the sulphuret of hydrogen by the oxide cannot take place in a very satisfactory way.

Except, as said before, on the bisulphide of carbon, this mixture of lime, sawdust, and copperas has an excellent purifying effect upon all the impurities. As long as there is any caustic lime left, this purifier will indeed be the most perfect one; and even if all the caustic lime is turned into sulphate of lime, this sulphate, in absorbing the ammonia, sets lime free, ready to absorb again the carbonic acid from the ammonia in the gas.

After its use, this mass in its chief elements will consist of sulphide of iron and carbonate of lime. Exposed to the air, the sulphide of iron will undergo exactly the same reaction as the oxide of iron mentioned before. One-third of its sulphur will be set free, and the rest of it will form the original copperas again, by absorption of oxygen from the air. Now, the essential point of the presence of lime is that the carbonate of lime will decompose the copperas,

forming sulphate of lime and oxide of iron, which will be, in its original condition, very finely divided and very effective upon the sulphuret of hydrogen.

Now, practically, if a suitable iron ore can be bought cheaper than copperas, there is, from a theoretical view, no objection why half of the weight of the copperas could not be substituted by ore or iron borings. In such case a mixture of 33 per cent. of lime, 33 per cent. of sawdust, 16½ per cent. of copperas, and 16½ per cent. of iron ore, would have just as good results.

But of course the iron ore is very variable, and its effect depends on the per centage of oxide of iron and of its divided condition.

The most perfect purification of the gas would be obtained by the use of the mixture of lime, sawdust, and iron in the purifying-boxes, and the use of a very small quantity of lime, either dry or wet, afterwards, for neutralizing the carbonic acid.

This purifying process, combined with the use of the ammoniacal liquor in the scrubber, for removing the bisulphide of carbon, would furnish the purest gas of the highest illuminating power, which can be manufactured practically, and very cheap.

The remainder of the sitting was occupied with conversation on some proposed modifications of the constitution of the association.

[The discussions at these meetings are condensed from the report of our contemporary, the *American Gaslight Journal*, but it is proper to say here that we print the papers exactly as we receive them.—Ed. J. G. L.]

CREMATION.

[The substance of a Paper read before the St. George's Literary Club, Manchester, on Thursday June 11, by Mr. WALTER SMITH, indoor superintendent of the Salford Corporation Gas-Works.]

That our ancestors practised cremation is evidenced by the contents of mounds which have at various times been opened up. Homer, the Greek poet, who flourished many hundreds of years before Christ, speaks of this mode of disposing of the body, in referring to the death of Achilles; and Virgil, the Latin poet, and Cicero mentions it. The body of Severus, the Roman emperor, was burned on a hill near to Holdgate, York. The Burmese honour their dead priests by burning their bodies; and in Siam, Pegu, and India cremation is an institution. My views may be opposed by those who have been in India. Owing to the coarse manner in which bodies are burnt there, and the total absence of any scientific application, I consider such cremation to be a gross nuisance. By the plan pursued in India more carbon and hydrogen are thrown off than can combine with the oxygen in the air, and there must be immediately produced that sickening stench which, when associated with the burning of a human form, must indeed be intolerably and repulsively offensive. Mr. Smith next referred to the component parts of the human body. A man weighing 140 lbs. would in that weight represent more than 90 lbs. of water. We are made up of oxygen, hydrogen, nitrogen, chlorine (which are all gases), carbon or charcoal, sulphur, iron, phosphorus, calcium, potassium, sodium, magnesium, fluorine, silicium. Before describing the furnace which he proposed to employ, it might be as well to ask them to bear in mind this incontrovertible axiom—that as they could not create matter, so it was equally impossible to destroy it. They might change and re-change and change again, but they must employ the same building material, as they could not produce new ones. They consumed by the action of fire a piece of wood, and it vanished, but it became so much steam and carbonic acid gas. The apparatus or furnace which he would recommend would be an exceedingly simple one, and in five hours he would be able to consume by fire all the bodies which in Manchester and Salford were daily deprived of life—say, 43 during the 24 hours. He would erect a mortuary plant, consisting of say 102 cylinders or retorts, made of fire-clay. These should be in sets of six, and he should consequently have 17 sets, each consisting of six cylinders or retorts. The largest of these retorts should be 8 feet long and 5 feet in diameter; the smallest of sufficient size to contain the body of a child of three years old. The retorts should be constructed to open at both ends, and when fixed and embedded over the furnace one end should be hermetically closed by an iron lid, which, by the turning of a handle, might be opened when necessary. At the top of each cylinder there should be a hole of a certain diameter communicating with a tube which should communicate with another cylinder of the same set. Further, he would have an air-conduit or channel of fire-clay running through the furnace, and communicating with the outward air at one end, and at the other with a tube, which should be attached by a luting to the lid of the cylinder. This arrangement would conduct the atmospheric air into the fire-clay culvert in the furnace, and the air would be heated. It would thus discharge itself through the tube in the lid of the cylinder into the cylinder itself, and the oxygen of this atmospheric air would immediately combine with the carbon of the body to form a carbonic acid gas. The oxygen would unite with the free hydrogen, and they would form steam, and much of the nitrogen would escape as a free gas. One consideration of extreme importance would be to arrange that the tube conducting the atmospheric air into the cylinder should be of a somewhat large diameter, so that more oxygen than the exactly combining quantities with hydrogen should unite, otherwise explosion would naturally be the consequence. By a tap attached to the tube he would regulate the supply of air. Much of the hydrogen and oxygen of the body would escape as steam, as hydrogen was in the body united with oxygen to form water, and this combination would simply escape as steam, and the water would not be resolved into its two elements, oxygen and hydrogen. This, of course, might be accomplished by the action of electricity, but no benefit would ensue. The small quantity of sulphur would combine with the oxygen to form sulphurous acid. The draught for the supply of the furnaces would be encouraged by a chimney, and into this, conducted by a channel through the flues, the gases from the cylinders would enter after having been thoroughly fumed by the action of heat on their passage through the two cylinders. Thus the gases and vapours representing the rapid burning of 50 bodies would escape into the atmosphere in such forms as to be less prejudicial to the community than the vapours issuing in full volume for 24 hours from one factory chimney. The residue of the body would be salts of lime, and very little charcoal or bones would remain. Retorts to the number of 102 would be amply sufficient for the combustion of the daily mortality of Manchester and Salford, even if that daily mortality were to represent 200 in place of 43 bodies. They would perceive that he provided two cylinders for each body, so that the vapours from the lower cylinder, if not thoroughly reduced, would be again subjected to further heats on their entrance into the second cylinder, and thus the reduction into the component parts would be fully determined. Other gases of a somewhat complicated nature would in small quantities be formed, but their action would be of no moment, as their quantities would be almost infinitesimal. In the district of Manchester and Salford they might calculate that 15,000 people died every year, and of the population of London 90,000. If they made an average of the weight of this dead humanity, say at 84 lbs. per body (including children), they had represented for Manchester and Salford about 560 tons of corruption per annum, and for London nearly 3400 tons. Some of the cemeteries or graveyards of England had become so full of corruption as to render the earth totally unable not only to deodorize, but even unable to reduce the bodies into any other shape than that of a wet and soppy mass. However the elements of the body might after death be scattered by the mode of death or cremation, surely the Great Cause could collect those elements from both earth and air. He would not deprive the clergy, by cremation, of the revenue they received from burial fees, but they should still associate their lives with men's mortality. If their dead friends could return, they would surely advise them not to corrupt the earth with their remains, as the body was but the tenement of the soul.

THE PNEUMATIC GAS COMPANY.

A new company is announced under the above-mentioned name, and on the limited liability principle, for the purpose of introducing into this country an American patent process, by which the production of cheap illuminating gas may be made, as it were, a sort of domestic operation. Of course, it does not in any way aim at superseding ordinary coal gas amongst those communities that have such a valuable commodity provided for them by gaslight companies or by municipal bodies, but rather to occupy the ground that is at present unoccupied, as in very small villages, railway stations, warehouses, private mansions, places of worship, schools, asylums, mills, factories, and other industrial establishments that have hitherto been beyond the reach of gas companies, by being far removed from large and important centres of population.

The process to which we refer is that of the production of gas of great illuminating power by the use of the highly volatile liquid known as "gasoline," which is one of the most inflammable substances produced by distilling petroleum; in short, it is petroleum spirit highly rectified, and in its most perfectly refined condition. By means of very simple mechanism a current of atmospheric air is made to pass through the gasoline, which is contained in a tank or gas-generator, sunk for convenience into the ground, or, it may be, deposited in a cellar. The air as it is forced through the liquid hydrocarbon becomes highly charged with its vapour; indeed, the atmosphere is simply made the medium for conveying the illuminating substance to the gas-burner. As the gasoline or petroleum spirit is a hydrocarbon compound, containing no other chemical elements than hydrogen and carbon—the former as the inflammable agent, and the latter as the ingredient which gives the luminosity—there is no need for any purifying operation, as in the manufacture of coal gas, there being no impurities to remove; and, indeed, it would be difficult to conceive of a process whose simplicity is greater than the one in question. The product is called "pneumatic" gas from the circumstance of atmospheric air being used in the manner already mentioned—carburetted at the expense of the vapour which it absorbs. With equal appropriateness it might also be called "air" gas.

Gasoline may be obtained in any amount, and therefore the supply of pneumatic gas need not fail. Then, again, as to its illuminating power, we may mention that Dr. Wallace, F.R.S.E., gas examiner for the city of Glasgow, has examined and thoroughly tested the gas produced by the process, and his statement regarding it is that its luminosity is equal to 20½ candles. He further says that the gas is quite equal to that supplied to Liverpool and Manchester, and far above the luminosity of the gas supplied in London, Birmingham, and other large towns of England. With proper burners the pneumatic gas can be most economically burned. Such burners are specially constructed in America, and Dr. Wallace speaks of them as being exceedingly ingenious.

The apparatus for the manufacture of this air gas is made by Messrs. Laidlaw and Son, Glasgow, whose professional reputation as gas engineers is well known, both at home and abroad; and within the last few months the patent has been worked with great success by a private company in Glasgow, and our correspondent in Scotland writes that one contract has recently been concluded for a large factory at Auchterarder, in Perthshire, to supply 600 lights. Craigends Castle, near Milngavie, a few miles out of Glasgow, is also to be lighted by the air gas, and he states that many inquiries have recently been made regarding the process, and the kind and price of the gas which it yields; we are told also that some excellent contracts are on the verge of being closed. The gas, it is said, can be supplied at 4s. per 1000 cubic feet, the cost of the necessary mechanism being exceedingly small when compared with that of an ordinary gas-works, as almost all the labour, fuel, repairs, &c., are saved, together with the many petty annoyances that are experienced in connexion with lighting by coal gas in the country. During the last four or five years the system has been most extensively adopted and used successfully in America, and within the last few months several Glasgow gentlemen have assured themselves on the matter by visiting that country.

IRON AND COAL TRADES OF SHEFFIELD, NORTH DERBYSHIRE AND SOUTH YORKSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The first net result of the settlement of the miners strike is that the price of fuel has already begun to droop. One of the oldest colliery firms in the neighbourhood of Sheffield (the Sheffield Coal Company) has issued a circular lowering quotations in some particulars. Their present prices are, therefore, as under:—Best picked branch coal, 16s.; Silkstone coal, 13s. 6d.; seconds coal, 11s.; screened nuts, 10s.; and ordinary engine slack, 6s. per ton of 21 cwts., at the pit mouth.

Now that the whole of the collieries—with the sole exception of Earl Fitzwilliam's men at the Low Stubbin and Elsecar Collieries—are again at work, and that, too, at lower wages, we may very naturally expect a general reduction in the prices of both coal and coke.

Generally speaking, there is very little change indeed to record in the state of the local iron trade. Orders do not flow in very readily, and such as do come to hand are of very small calibre. The foundries are, perhaps, best employed, but some of them are troubled by not being able to obtain certain brands of Scotch pig which they are accustomed to use for mixing purposes. The current rates quoted by agents for Cleveland pig iron are about as under:—No. 1 foundry, 77s. 6d.; No. 2 foundry, 75s.; No. 3 foundry, 72s. 6d.; No 4, 66s.; No. 4 forge, grey, 59s.; No. 5 forge, mottled, 58s.; No. 6 white, 57s.; refined metal, 87s. 6d.; Kentledge, 75s.; and cinder, 52s. 6d. per ton. Derbyshire pig is unaltered, being mostly delivered under long-dated contracts, which are made at special prices in almost every instance. The foundries at Staveley, Clay Cross, Renishaw, &c., continue to have a fair amount of work in general castings and pipe work.

The Yorkshire agricultural show, which was held here on Tuesday, Wednesday, and Thursday last, attracted much attention, and brought together a very fine display of implements and machinery. Messrs. Newton, Chambers, and Co. showed a fuel-saving range and cooking apparatus of a high order of merit, and there were several gas-making machines exhibited.

A company, having a nominal capital of £5000, has been formed to supply Eckington (North Derbyshire) with water. The source of this supply is a somewhat novel one, being, in fact, a large spring in the shaft of the Hornthorpe Colliery, 120 yards from the surface. Mr. Allen, public analyst for Sheffield, pronounces the water quite pure. The works will be put in hand at once, and will be completed within three months.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Rather more activity is noticeable in the finished iron trade, and though the new business transacted during the past week has not been extensive, the ironmasters report that they are rather busier, more especially in the manufacture of sheets, hoops, and plates, for which prices are generally well sustained. Sheets are quoted £13 to £14; but they may be had as low as £12 10s.

On the higher qualities Messrs. Baldwin, of the Wilden Works, announce a reduction of 20s. per ton this week, which makes their prices up to 20 W. G., £15; for Severns B., £18; B.B., £19; B.B.B., £20 10s.; best charcoal, £29 10s.; E.B. charcoal, £29 10s.

The pig iron trade continues languid, and, beyond a slightly better demand on account of the German market, shows no improvement. Cleveland and Derbyshire pigs are coming into the district rather freely, and local producers

are suffering greatly by the keen competition of those districts. Of the 153 furnaces erected in the South Staffordshire district, only 49 are now in blast.

In the coal trade the masters show no disposition to make any further concession in price, notwithstanding that the output is greatly in excess of the demand, and stocks are rapidly accumulating; but a reduction at no distant date is generally looked for.

The first annual meeting of the South Staffordshire Mines Drainage Commissioners was held at Wolverhampton on Wednesday last. The report stated that, owing to the inability of Mr. David Peacock and Mr. Henry Johnson to act as surveyors, much delay had been caused; but assistant surveyors had been engaged in each district, and it was hoped that in due time a well-considered scheme of drainage would be produced. The report was adopted, and a drainage-rate of 1d. on every ton of minerals raised within the drainage area was ordered. The rate is estimated to produce £30,000. Mr. G. I. Barker, of the Chillington Iron Company, was re-elected chairman of the commissioners. The wrought-iron tube and fitting makers experience an improved demand, and one of the leading firms in Wolverhampton is reported busy. The iron foundries around West Bromwich are in fairly active operation, and the inquiry for gas and water pipes is somewhat better.

IRON AND COAL TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The recent sudden change in the weather has caused a somewhat better demand for house coal during the past few days, and the reductions in the Manchester district announced last week have also had the effect of bringing orders more freely into the market. Prices, however, in the Lancashire coal trade generally are not settled, and other districts are following the Manchester market to a more or less extent.

In the Tyldesley district a reduction of about 6d. per ton has been made in the list prices, and this has caused trade to be steadier; there is a much better demand for house coal, and engine fuel and slack are in very fair request.

Slight concessions are also being made by many of the firms in the Wigan district, but the leading coalowning concerns are still maintaining their quotations.

The contract season for gas coal is now about over, and although a few inquiries keep coming to hand, no large amount of business is being done; prices, however, are firm, and range about 12s. to 15s. for screened gas coal, and from 30s. to 35s. per ton for gas cannel at the pit mouth.

The Ashton and Oldham strike has at length collapsed, the men having resumed work on the masters terms—viz., 15 per cent. reduction in wages.

In West Lancashire the wages question has been under consideration for some time past, and a private meeting of the leading colliery proprietors has been held in Liverpool for the purpose of considering the propriety of making a reduction, the general feeling of the meeting being in favour of 10 per cent.

During the week there has been a slight improvement in the iron trade, and although no large amount of business is being done, there is a very fair demand for foundry pig iron for prompt delivery, and prices, which are a trifle stiffer, range about 77s. 6d. per ton for delivery in the Manchester district. Forge iron, for which there is not so much inquiry, ranges about 66s. 6d. per ton. A few shipping orders for manufactured iron have found their way into the market, and merchants have been buying a little on account of stock, but although the forges are busy it is on work mostly of a hand-to-mouth character, and the general trade is dull. Bars are worth about £9 15s. delivered, light rails about the same, and heavy ditto about 20s. less, but prices are irregular.

The various iron-works continue very fairly employed, and the blast-furnaces in South-West Lancashire are, as a rule, fully at work, but the hematite trade in North Lancashire is rather dull.

COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England does not show much change week after week. Best steam coals are a little lower, and are less inquired after; but fair qualities of seconds command a good position in the market. There has been an abundance of coasting vessels—in fact, more tonnage than there are orders in the trade, and outward coasting freights are somewhat lower in consequence. The gas companies and other consumers in the smaller towns on the east coast and on the Channel will get their back orders filled up without much difficulty. All kinds of inferior coals—such as manufacturing, small steam, blacksmiths small, duff, and the like—continue to be a complete drug in the market. The collieries are entirely overstocked with these sorts, and buyers, as a rule, may purchase any quantity they like at extremely low prices—indeed, small steam is quoted at from 4s. to 4s. 6d. per ton. The gas coal trade does not exhibit much change. High-class collieries have a good few contracts running, and there is always an inquiry at this season of the year for best gas coals for shipment. The smaller and less-known pits, however, are doing a very poor business, and inferior gas coals command an extremely low price in the market. Household coals are in fair demand. The Northumberland steam coalowners have given their men notice of a further reduction of wages. The Durham coalowners have done the same. The point will probably be compromised, and another fall of 10 per cent. upon wages established. This is the general opinion in the district.

In the iron trade of the district there appears to be more activity in the pig than in the finished iron trade. Business, however, appears to be establishing itself upon a pretty sound and steady basis, and there seems to be every prospect that the iron trade of the North will gradually work its way into a better position. There appears to be a good deal of speculative business in the pig iron trade, especially amongst the middle-men. It is alleged that buyers are "bearing" the market just now; possibly next week sellers will be "bulling" it; but behind this there is no doubt a slow but regular inflow of healthy trade which is establishing itself. Business has been pretty steady in the chemical trade within the past ten days. There are better accounts from America; generally this business is improving. With regard to other branches of manufacturing trade there is little change to note from last week. Shipments to the Continent are fairly good, but nothing extraordinary. There has been a considerable falling off in Baltic business from the Tyne this summer.

GAINSBOROUGH GAS SUPPLY.—The question of the acquisition of the gas-works by the local board has been mooted, and the clerk to that body has been directed to write to the gas company, and ascertain whether they wish to sell their undertaking, and, if so, upon what terms.

THE WILLENHALL GAS COMPANY.—The usual half-yearly meeting of this company was held on Wednesday last—Mr. H. H. Hewlings presiding—when a dividend at the rate of 10, 5, and 7½ per cent., on class A, B, and C shares respectively, was declared; and the works and plant of the company were reported to be in a satisfactory condition. The other business was of the usual routine character.

BURSTING OF A RESERVOIR AT DUNOON.—Early on Friday morning, Balgayburn, on Kilbride Hills, overflowed its banks, and, breaking into an embankment of a reservoir in course of construction for the supply of water to the inhabitants of Dunoon, swept away 5000 cubic yards of material, with a large quantity of plant. The loss to the contractors, Messrs. J. and R. Band, Dundee, will be considerable. The works, which were expected to be finished in two months, will be delayed another month. Two hundred men were employed upon the works.

REDUCTION IN THE PRICE OF GAS AT DOVER.—By arrangement with Messrs. Anderson and Jones, the directors of the Dover Gas Company have given notice of a reduction of 3d. per 1000 on the 1st of October, and of a further reduction of 3d. per 1000 on the 1st of January, thus bringing the price down to 4s. 3d. per 1000 on the 1st of January.

WAKEFIELD PUBLIC LIGHTING.—At the quarterly meeting of the Wakefield Town Council, on the 5th inst., the corporate seal was affixed to an agreement with the gas company for lighting the public lamps. It was stated that the price of gas was to be 3s. 9d. per 1000 feet, or 3d. per 1000 less than under the last agreement. It was also stated that about 40 additional public lamps had been fixed recently in different parts of the borough.

WATER FAMINE AT ALDERSHOT.—The scarcity of water is seriously felt at Aldershot, and causes much inconvenience, especially in the camp and barracks. During the last few days the water has become so scarce that very stringent orders have been issued that for no purpose, except for domestic consumption and the use of sick horses, is any water whatever to be drawn from the mains.

REDUCTION IN THE PRICE OF GAS AT RUGBY.—The directors of the Rugby Gas and Coke Company have given notice to their consumers that, in consequence of some reduction in the price of coal, they have determined to reduce the price of gas 5d. per 1000 feet, and that from Sept. 24 next the price per 1000 feet will be 4s. 2d., as before the rise in September, 1872, with 5d. discount per 1000 feet for payment within 28 days of each quarter day.

HULL GAS SUPPLY.—The report of Mr. Baynes for the month of July shows that the gas supplied in the Sculcoates and Myton district by the British Gas Company, was good, and uniform in illuminating power and chemical purity; the sulphur compounds were low; there was the usual absence of sulphuretted hydrogen and free ammonia. The results for the month are:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·85	15·83	16·30
Grains of sulphur per 100 feet.	12·70	11·30	11·90
Grains of ammonia per 100 feet	—	—	—

Mean barometer and temperature in experiment-room:—Bar., 30·18; tem., 68°.

GAS EXPLOSION AT WALWORTH.—Early on Saturday morning considerable excitement prevailed in East Street, Walworth, in consequence of a terrific explosion of gas, which, it is feared, will result in the loss of two lives. The explosion occurred on the premises of Mr. W. Williams, No. 199. An escape of gas being discovered by the inmates, a candle was used to ascertain the leakage, when the explosion took place, doing immense damage. As soon as the *débris* was cleared away, Mr. Joshua Williams, aged 54 years, was found severely burnt on the face and hands—in fact, frightfully disfigured—and Miss Elizabeth Williams, aged 19 years, was also severely burnt. A medical gentleman quickly arrived, who advised immediate removal to the hospital. The engines and salvage corps were soon on the spot, and the fire was extinguished.

GAS EXPLOSION AT CATFORD.—Shortly before two o'clock, on Friday morning last, an alarming explosion happened at the residence of Mr. Edward Miskin, Gresham Villa, Catford. Two of the servants went into the back parlour with a lighted candle to seek for an escape of gas. A loud explosion ensued as soon as the room door was opened. The windows were blown out, the ceiling was torn down, and the room was soon enveloped in flames. Dennis's portable pneumatic fire-extinguishers were kept on the premises, and without delay one of them was brought into action by Mr. Miskin and another by his gardener; and the fire was got under before the flames had spread to other parts of the building. The two servants were found lying in the room suffering from dreadful injuries, and in an insensible condition. One had her head laid open by a piece of looking-glass, which had been broken by the force of the explosion, and faint hopes are entertained of her recovery. The other was much cut and burnt about the face and arms.

MANCHESTER CORPORATION WATER SUPPLY.—At the meeting of the City Council of Manchester, on the 5th inst., the town-clerk, referring to a notice which appeared in the newspapers, stated that the Water-Works Committee had ordered the water to be shut off from six o'clock in the evening to six o'clock on the following morning. He regretted to state that the recent rain had had very little effect upon the Woodhead reservoirs. He had just received a report from the office stating that the rainfall at Woodhead between six o'clock on Tuesday morning and six o'clock on the following morning amounted to only half an inch, and did not add more than 27 million gallons of water to the stock. At present the rainfall had not affected the reservoirs beneficially in any way whatever, except in lessening the unreasonable consumption of water in the watering of streets and gardens. He believed it was the intention of the committee to send a request to each township to cease altogether the watering of streets until they were enabled to furnish the ordinary supply.

KEIGHLEY GAS AND WATER SUPPLY.—At the monthly meeting of the Keighley Local Board, on the 4th inst., the progress of the water-works was stated to be satisfactory. Pipes were being laid down in certain parts of the town, but they could not be completed until arrangements were made with the Duke of Devonshire as to the extension of the lease for the reservoirs. The deputation which had been appointed to visit Leeds to get information as to their sewage works reported that they were upon an extensive scale, and their cost would vary. They called the attention of the board to a new Act of Parliament for regulating the proceedings in connexion with local boards, pointing out certain sections which would specially affect them. The report of the Gas-Works Committee was read, and it was recommended that the salary of Mr. Laycock, the superintendent, should be advanced from £165 to £200 a year. The motion was carried. It was then stated that one of the public lamps had been broken by some boys throwing stones. Two of the lads, who were 16 years of age, were present with their parents. It was decided that, on condition that they would offer an apology, and insert the same as an advertisement in the newspapers, and pay for it, together with the cost of repairing the lamp, no legal proceedings should be taken against them.

KIRKINTILLOCH AND LENZIE NEW WATER-WORKS.—The opening of these works was celebrated on the 4th inst. The *Glasgow Herald* gives the following description of the undertaking:—The works consist of a fire-clay aqueduct, the diversion of hill streams, inlet wells for receiving these and the water of the Woodburn, a storeage-tank and valve-well, an impounding reservoir, with the necessary filter-beds, laying of cast-iron and fire-clay main and branch pipes, with all requisite connexions. The drainage area of the Drumairn basin is estimated at about 300 acres of trap country, the minimum available rainfall being taken at 30 inches; and this supply is augmented by numerous springs having a constant flow. The Water Commissioners have also power, and have made the requisite connexions, to draw from the Corrie basin when necessary, which has also an area of about 300 acres. The whole of the water in the Drumairn basin is very pure, having but small proportions of vegetable and mineral impurities, and this renders its value for domestic purposes very high. The Corrie water is not quite so pure, but is nevertheless of good quality. The system of collection is carried out by means of inlet wells placed in suitable positions, from which the water is conveyed, partly by fire-clay and partly by cast-iron pipes, to a storeage tank of 180,000 gallons effective capacity, or one day's maximum supply to a population of 7000. The tank, which presents some novelties in construction and action, is 60 feet in diameter and 12 feet deep; is built of red and white bricks, the latter glazed with white enamel, forming the face of the work, and the brick bottom is covered with a cement floor. A division wall, half of which carries a copper wire-cloth strainer, divides it into two parts,

one being the inlet and settling side, the other holding the clear water, which has passed through the strainer mentioned above, and from which delivery is taken. Provision has, however, been made to use the inlet-side as a delivery when repairs or scouring render it necessary to empty the delivery side. By this means, and as the delivery is self-acting, the supply need never be cut off. The supply to the town is regulated in the valve-well, and is conveyed by an 8-inch main to Kirkintilloch, and thence to Lenzie by a 6-inch pipe, with all the requisite distribution-pipes. The total length of pipes laid exceeds 10 miles. The air, scour, and fire cocks throughout are similar, act in either capacity, and have been carefully placed in advantageous positions, so that in case of fire, with a head of water varying in the district from 100 to 250 feet, there will be great chances of speedy extinction. A considerable number of residents have taken advantage of private service, but the majority of the population will obtain water from the pillar and wall wells placed throughout the town in positions as convenient as possible. In Lenzie the supply will be from service-pipes. The cost of the scheme complete is about £2 10s. per head of the population.

Notes and Queries.

J. D. (Castlestown).—1. A gasholder of the dimensions stated will contain 8472 cubic feet. 2. A holder 1¼ foot in diameter and 1½ deep would be as accurate as you could make it. 3. We presume you mean a Twaddel's Hydrometer, which you must buy of a scientific instrument maker. Our correspondent should provide himself with Newbigging's "Handbook for Gas Managers."

Manager.—Being under the impression that by converting on our own premises our tar and ammoniacal liquor into other merchantable products, will be more profitable to the gas company than by disposing of it in its crude state as at present, could you give information as to the best mode or apparatus for so doing, and if there is at work on any gas-works a plant capable of doing so to its full extent? I hope you or some of your correspondents will kindly give the information, and point out the most economical method of proceeding. [Tar cannot be economically distilled on a small scale. The plant is expensive, and the process requires skilled superintendence. Ammoniacal liquor is easily converted into sulphate of ammonia. A simple and cheap form of apparatus has been devised by Mr. Eldridge, of Richmond, and Mr. Jones, of Dover, and may be seen at work at the former place. It is described in the JOURNAL OF GAS LIGHTING, vol. xx., p. 547.]

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

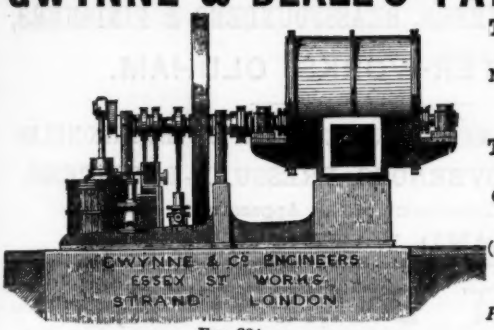

FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

WANTED, a steady, sober, industrious man as STOKER. Wages 24s. 6d. per week. Apply to Mr. T. H. BOUTFELL, Gas-Works, SLEAFORD.

WANTED, two experienced Fitters, able to do all main-laying and out-door service work. Must be sober and industrious, and able to produce good testimonials as to character and ability.
Address J. AND H. ROBUS, Bell Green, Catford, KENT.

WANTED, a leading Stoker in a Gas-Work, where clay retorts are used and the annual make of gas is about 13 millions.
Apply, by letter, stating wages required, and enclosing references, to Mr. JOHN BUDDEN, Manager, Poole Gas-Works, DORSETSHIRE.

WANTED, an experienced Gas-Fitter, one competent to lacquer and used to general shop work preferred. To a steady and good workman the situation will be permanent. State wages required and give references.
Apply to the MANAGER, Gas-Works, JERSEY.

WANTED, for a small Gas-Work in Lancashire, a steady working Man as MANAGER. Must understand laying mains and have a good knowledge of gas-fitting.
Applications, stating experience, age, references, wages, &c., to be addressed to J. T. HALL, Engineer, PRESCOT.

GAS MANAGER WANTED.

WANTED, a practical and experienced MANAGER, for the Lisburn Gaslight Company, Limited. Salary £120 per annum, with free house, fuel, and light. Security required.
Applications, with testimonials, will be received up till the 13th of August by JOHN M. CLURE, Secretary.
Lisburn, July 29, 1874.

WANTED, by a Gentleman, aged 27, a situation as MANAGER, on the Continent or abroad. Advertiser has been four years in present situation, where the make is above 90,000,000 feet per annum. Understands the manufacture and distribution of gas in all its branches. Speaks French and Italian. Leaving present situation on account of salary being insufficient.
Address SCIENCE, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROCHDALE CORPORATION GAS-WORKS.

TO IRONFOUNDERS.

THE Gas Committee invite Tenders for the supply of 1730 yards of 8-in. ordinary Socket and Spigot GAS-PIPES, with turned and bored joints, cast vertically in lengths of 9 ft. each, exclusive of socket.
Further particulars and forms of tender may be obtained on application to the Engineer, Mr. Samuel Hunter, Gas-Works, Rochdale.
Tenders to be sent to me on before the 18th inst., endorsed "Tender for Gas-Pipes."
The Gas Committee do not bind themselves to accept the lowest or any tender. By order,
ZACH. MELLOR, Town-Clerk.
Town-Hall, Rochdale, Aug. 6, 1874.

GAS.

THE Advertiser is desirous of acting as LONDON AGENT for a firm of Gas Engineers, Meter Makers, &c., or would be willing to enter into arrangements to undertake the management of such works. Highest references as to qualifications, experience, &c.
Address G. S., care of Mr. Vickers, 2, Cowper's Court, CORNHILL, E.C.

THE Advertiser, the son of a Gas Manager, 23 years of age, desires an engagement as ASSISTANT ENGINEER or Manager. Is a fair draughtsman. Has had three years experience in the manufacture of sulphate of ammonia. Can furnish testimonials as to ability.
Address A. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

VINCENT'S
PATENT IMPROVEMENTS
IN
Apparatus for Manufacturing Gas.
Particulars to be obtained by application to—
MR. LAYARD JONES,
ENGINEER,
25, OLD BROAD STREET, LONDON, E.C.

ADVANTAGES OF GAS FOR COOKING AND HEATING,
BY
MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their gas consumers.
Specimen Copy by post 4d., direct from MAGNUS OHREN, Gas-Works Lower Sydenham, London, S.E.

FOR SALE, a set of Four Dry Lime Purifiers, 7 ft. diameter, 3 ft. deep, 4 tiers of wrought-iron sieves, hydraulic centre-valve, 9-in connexions and lifting apparatus for covers. The above are in good working order, and are offered for sale on account of their being replaced by larger ones.
Apply to E. LORD, Whitworth Vale Gas Company, near ROCHDALE.

TO GAS ENGINEERS AND CONTRACTORS.

FIRMS willing to tender for immediate ALTERATIONS at Gas-Works at Irthlingborough, Northamptonshire, may obtain particulars on application to Mr. FOSTER, Secretary.

GLOUCESTER GAS COMPANY.

THE Directors of the above Company invite TENDERS for the excavation and brickwork required in the formation and completion of a GASHOLDER TANK, 135 ft. diameter and 35 ft. deep.
Plans and specification may be seen on application to the Company's Engineer, at the works.
Sealed tenders, endorsed "Tender for Brick Tank," to be sent in on or before the 20th inst.
The Directors do not bind themselves to accept the lowest or any tender. By order,
R. MORLAND, Engineer.
Gas-Works, Gloucester, Aug. 6, 1874.

IN consequence of the removal of Northumberland House, my Chambers are now No. 4, CANNON ROW, PARLIAMENT STREET, S.W.
Friends please take notice, and oblige
GEORGE ANDERSON.

BOROUGH OF ROTERHAM GAS-WORKS.

IN consequence of alterations and additions to the above works, the Corporation have FOR SALE the following GAS APPARATUS—viz.: Station-Meter in ornamental square case, 6 ft. 6 in. by 6 ft. 6 in., made by West and Gregson in 1855, thoroughly repaired in 1865, inlet and outlet 8 inches, with hydraulic valves and bye-pass, also a station-meter in round case, 4 ft. 9 in. diameter, made by West and Gregson.
12 Hydraulic Mains in cast-iron, 10 ft. 5 in. long by 16½ in. by 16½ in. wide, at per cwt., at the Gas-Works in Rotherham.
Also 6 metal Covers to same, at per cwt.
Also 56 metal H-Pipes, size 4 in., at per cwt.
Also 17 metal Mouthpieces, 23 in. by 15 in., at per cwt.
Also 17 metal Mouthpieces, 21 in. by 14 in., at per cwt.
Further particulars may be had of Mr. James Goodwin, Manager, at the Gas-Works, Rotherham.
Sealed tenders to be sent to me not later than the 18th of August next. By order,
W. WHITFIELD, Town-Clerk.
Corporation Offices, Rotherham, Aug. 8, 1874.

LIGHTING STREET-LAMPS.

NOTICE is hereby Given that the Lighting Committee of the Vestry of the Parish of St. Pancras are prepared to receive TENDERS for the painting once in every year and keeping in repair 3336 (or thereabouts) LAMP-COLUMNS, HEAD-IRONS, and LANTERNS, for a period to be named by the parties tendering, but not exceeding Five years.
Further particulars may be had, and a copy of the specification may be seen, at the Vestry-Hall.
The Vestry do not bind themselves to accept the lowest or any tender.
No tender will be considered unless good security be proposed therein for the due performance of the contract, and unless £20 in Bank of England notes been closed therewith, as evidence that the tender is made in good faith.
The £20 to be returned immediately to the parties whose tenders are not accepted, and to the others so soon as the bond and contract for the work has been duly signed, or to be forfeited in the event of any neglect or refusal to sign the bond and contract.
Tenders, to be marked, "Tender for Repairs to Lamp-Posts, &c.," to be sent in not later than Monday, the 14th day of September next, at Two p.m.
By order,
THOS. ECCLESTON GIBB, Vestry-Clerk.
Vestry-Hall, Pancras Road, N.W., Aug. 10, 1874.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (feap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK.
BY THOMAS NEWBIGGING, A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

TO GAS COMPANIES.

A Quantity of Bright Derbyshire Gas COAL, of excellent quality, having been carefully tested in practical working, FOR SALE.

For quotations, address Mr. W. A. Plumbe, Mansfield.

CANNEL.

THE West Yorkshire Iron and Coal Company, Limited, will be glad to receive FORMS for TENDERS from Gas Companies and others requiring a supply of CANNEL.

Address, 72, Wellington Street, Leeds.

TO COLLIERY OWNERS, &c.

THE Directors of the Barnsley Gas Company hereby invite TENDERS from parties willing to contract to supply and deliver at their works, situated at Old Mill and Pontefract Road, Barnsley, respectively, RIDDLED SLACK, or NUTS, and SOFT COAL of the best quality, for Gas Making, that they may require for a period of One, Two, or Three years (as may be agreed upon), from the 1st day of October, 1874; the said Nuts or Coal to be delivered in a dry condition, free from smudge, dirt, shale, pyrites, or other impurities, at either of the said works, in such quantities and at such times as the Manager may direct. There are railway sidings into both works, or, if more convenient to the parties tendering, they may deliver the said Nuts or Coal by cart at either of the said works, which latter method the Directors would prefer.

Prices may be quoted either by cart or rails, and sealed tenders, stating respectively the price for Nuts or Coal delivered as above, endorsed "Tenders for Coal," and addressed to the Chairman, must be left at the Gas Company's Office on or before Thursday, the 13th day of August next.

Any further information required may be obtained on application to the Manager, at the Works.

The Directors do not bind themselves to accept the lowest or any tender. (By order)

Gas Offices, Pontefract Road, Barnsley, July 24, 1874. John Hutchinson, Manager.

PIPES.—A large stock of 3-in., 4-in., 6-in., and 8-in. Cast-Iron SOCKET and SPIGOT PIPES (usual weights) ready for immediate delivery, either f.o.b. or ex ship or steamer in the Thames.

Address the Manager, Milton Iron-Works, West Hartlepool.

BIRTLEY IRON WORKS, CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. Manwaring, 101 Cannon Street E.C.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. Maddocks, Manager of the Gas-Works, Kettering.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

Now Ready, price 10s. 6d.,

AN ANALYSIS OF THE

METROPOLITAN GAS COMPANIES ACCOUNTS

FOR 1873,

COMPILED AND ARRANGED BY JOHN FIELD,

Chief Accountant to the Imperial Gas Company.

Can be had of the AUTHOR, at 26, ARUNDEL SQUARE, ISLINGTON, per post,

or of

WM. B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

GEORGE ORME & CO.,

GAS METER MANUFACTURERS, BRASSFOUNDERS & FINISHERS,

ATLAS METER-WORKS, OLDHAM.

CONSUMERS WET & DRY GAS-METERS ON THE MOST APPROVED PRINCIPLES.

STATION-METERS, GOVERNORS, PRESSURE-REGISTERS,

And every Description of Gas Apparatus.

GAS, STEAM, AND WATER FITTINGS.

ROBERT DEMPSTER,

GAS ENGINEER AND CONTRACTOR,

ROSE MOUNT IRON-WORKS,

ELLAND, near HALIFAX,

MANUFACTURES AND EFFECTS

GAS APPARATUS & MACHINERY

OF EVERY DESCRIPTION.

GAS EXHAUSTERS,

WITH STEAM-ENGINES COMBINED.

DRY, CENTRE, AND BYE-PASS VALVES; WROUGHT-IRON AND CAST-IRON SCRUBBERS; ANNULAR AND PIPE CONDENSERS, ALL SIZES.

PURIFIERS from 4 to 40 FEET SQUARE.

Steam-Engines and Steam-Pumps.

RETORT SETTERS & FITTERS SENT TO ALL PARTS.

ALL WORK AND MATERIALS GUARANTEED OF THE BEST DESCRIPTION.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over twelve years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

Reference is kindly permitted by the Engineers of the City of London, Commercial, London, and Surrey Consumers Gas Companies, who pronounce it the best Paint known for their purposes.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

THE

PNEUMATIC GAS COMPANY,

LIMITED.

To be formed under the Companies Acts, 1862 and 1867.

CAPITAL - - - - £40,000,

IN 8000 SHARES OF £5 EACH.

ISSUE of 4000 SHARES,

4000 Shares being taken by Vendors in part payment of Patent, half of which are B or Deferred Shares.

PAYABLE—

On Application	£1	0	0	per	Share
On Allotment	1	0	0	,,	,,
On October 1st	1	0	0	,,	,,
On December 1st	1	0	0	,,	,,
On January 2nd, 1875	1	0	0	,,	,,

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A thoroughly safe, economic, and simple mode of illumination, as superseding the present expensive coal gas, has long been a desideratum, and has at last been found in the Pneumatic Gas Machines offered by the present company. After a test of several years of many thousands of the machines in America, they have been pronounced the safest, cheapest, and most reliable gas apparatus made, for lighting, at small expense, railway stations, country and suburban residences, churches, schools, warehouses, mills, asylums, mines, &c. The insurance companies of the United States, and those who have seen and examined the machine in this country, approve of its use; and from its extreme simplicity it can be managed by any one. The gas produced is of the finest quality, affording a pleasant brilliant light not fatiguing to the eyes, equal in illuminating power to over 20½ candles (the average of English coal gas being about 16 candles), and entirely free from sulphur and other impurities common to coal gas, which have rendered the latter objectionable for use in drawing rooms, libraries, conservatories, &c.

It is manufactured at a cost of about 4s. per 1000 cubic feet, and the machine is easily adjusted to work connexion with existing gas-fittings in a house. It has been largely used in the United States, with increasing popularity, for the past five years, and while all other machines aiming at the same results have proved failures, this one has in every instance given complete satisfaction, and been found perfectly safe.

One of the most fruitful sources of annoyance connected with ordinary gas-works, as applied to private mansions, arises from the necessity of having a man always in charge (usually the gardener or under-gardener), to whom the work is distasteful, and who, either from ignorance, carelessness, or neglect, allows the retorts to burn out, thus causing constant expense for repairs. It is estimated that the whole cost of this machine will often be recouped in a single year by the great saving in coal, labour, attention, and repairs.

The machine consists of a tank or gas generator, which is sunk in the ground outside the building, holding the liquid called gasoline and a cylinder or air-pump, placed in the cellar closet or low flat of the house, worked by weights attached. These require winding up once or twice a week, which can be done by any one in a few minutes. This operation, and the supply of gasoline once or twice a year, is all that is requisite in the manufacture and supply of the gas. The gas generator being sunk under ground, occupies no surface space, and does not interfere with the amenity of pleasure grounds.

Drawings and description of the machine accompany the prospectus, as well as reports of Dr. Wallace, F.R.S.E., gas analyst to the Corporation of Glasgow, and of Messrs. R. Laidlaw and Son, the eminent gas engineers, given after they had carefully tested the apparatus for some months, and satisfied themselves of its entire safety, utility, and economy. The cost of constructing the Pneumatic Gas Machines will not exceed one-third that of the ordinary coal gas apparatus of equal capacity, thereby enabling the company to sell them at moderate prices, and at the same time yield large profits to the company. The supply of gasoline is both abundant and available. It is proposed to purchase the patent for the whole of the United Kingdom for the sum of £16,000 in cash, and £20,000 in paid-up shares of the company, one-half of which are deferred or B shares, not entitled to dividend until the ordinary shares have received dividend at the rate of 10 per cent. per annum.

The revenue of this company will be derived principally from the sale of gas apparatus and its appliances, and from the sale of licences and royalties to use the patent. The American profits from the sale of gas apparatus and its adjuncts have exceeded £10,000 per annum, which should be improved on here, as, in addition to the sale of its machines, large sums may be realized from the sale of licences to use the company's patent, and in this connexion it may be stated that, as the sale of royalties in America has already exceeded the sum of £50,000, it is not unreasonable to hope that, from this source alone, its entire capital may be recouped and distributed to the shareholders as bonuses in a few years.

The directors, with a view of earning a high rate of dividend, have fixed the capital of this company at a moderate amount. In this country the cost of manufacturing the machines is cheaper and the facilities for their disposal greater than in America, but should the results here only equal those attained in America, the profits would suffice to pay a very handsome dividend.

Already orders have been taken, and many inquiries for machines been made, and there can be no doubt that this company will at once enter upon a large and profitable business.

The only contract entered into is one bearing date Aug. 4, 1874, between Michael Johnston of the one part, and Robert Alexander Mair of the other part, which, together with the Memorandum and Articles of Association, can be seen at the office of the Solicitors to the company.

Applications for shares must be made on the accompanying form.

If no allotment is made the deposit will be returned in full.

Prospectuses and forms of application can be had from the Secretary or Bankers of the company.

Glasgow, Aug. 10, 1874.

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Roca, Don José	—	Barcelona, Spain
Royal School of Mines	—	Stuttgardt, Wurtemberg
Rosser, Thomas	Several Works	Nantes, France
Robins	Cement Works	Northfleet
Russell, J., and Sons	For Export	Wednesbury
Russian Spinning Company	—	St. Petersburg
Sampson Cotton Spinning Company	—	St. Petersburg
Saunders, Thomas, Esq.	Paper Mills	Dartford
Shangshieff, M., Esq.	—	St. Petersburg
Schipoff and Company	—	Moscow
Shropshire Union Rail. & Canal Co.	Ellesmere Port	Cheshire
Shute, Thomas, Esq.	Silk Mills	Watford
Smith and Sons.	Paper Mills	Watford
Smith, G. L., Birmingham	Chassepôt Rifle Fcty.	Spain
Smith, M.	—	Yokohama, Japan
Stephens, G., Esq.	Courier Office.	Brisbane, Australia
Stears, T. W., and Company	Several Works	Hull
Sydney Sugar Company	—	Sydney, Australia
Thompson and Company	Sail Cloth Factory	Fordingbridge, Hants.
Towgood Brothers.	Paper Mills	St. Neots
Towgood, E., Esq.	Ditto	Sawston, Cambridgeshire
Towgood, A., Esq.	Ditto	Helpstone
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Theatre Royal	—	Messina, Sicily
Tidcombe and Son	For Export	Watford
Treschow, C., Esq.	—	Lorwig, Norway
Tudela and Bilbao Railway Co.	Railway Station	Bilbao, Spain
Tzarskoe-Celo Railway Company	Ditto	St. Petersburg
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Whitehouse, David, Esq.	Iron and Tin Works	Abercarne, Monmouthshire
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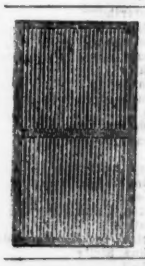

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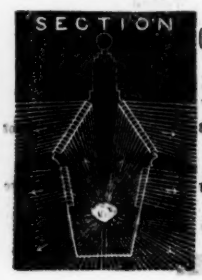

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Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
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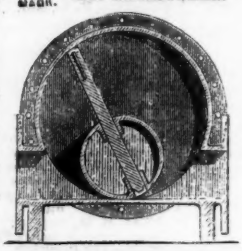

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LAMP REGULATOR

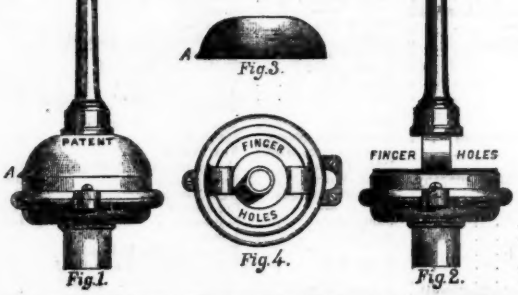

Fig.1. Fig.4. Fig.2.

D. BRUCE PEEBLES AND CO.,
ENGINEERS, WET AND DRY GAS-METER MANUFACTURERS,
PATENTEES OF
GAS REGULATORS FOR PUBLIC LAMPS, FACTORIES, PUBLIC HALLS, AND DWELLING-HOUSES.

Attention is respectfully requested to the following extract from a lecture "On the Economical Combustion of Coal Gas," delivered to the Philosophical Society of Glasgow, by Dr. W. Wallace, F.R.S.E., F.C.S., Gas Examiner for the city of Glasgow, on the 4th of March last:—
"A few years ago, a simple form of Gas Regulator for Street Lamps was introduced, I do not know by whom, and various forms of it, and improvements on it, have been made by many practical gas engineers. Of all the modifications of the instrument, the best in my opinion is that of Mr. D. Bruce Peebles, of Edinburgh; in fact, his Lamp Regulators are so superior that they are likely to supplant all others. Already about 9000 of these have been applied to the street-lamps in Glasgow, and I understand it is the intention of the authorities to introduce them all over the town. The saving thereby effected I calculate to be about £6000 per annum, without any diminution of light. One of the great advantages of Mr. Peebles's apparatus over all others is that it can be regulated while the gas is burning."
Since the above date, another 1000 have been supplied to Glasgow, and they are being largely adopted at home and abroad.
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Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

To Messrs. John Wright and Co., Essex Works, Birmingham. *Crystal Palace District Gas Company, Lower Sydenham, S.E.*

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, your faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

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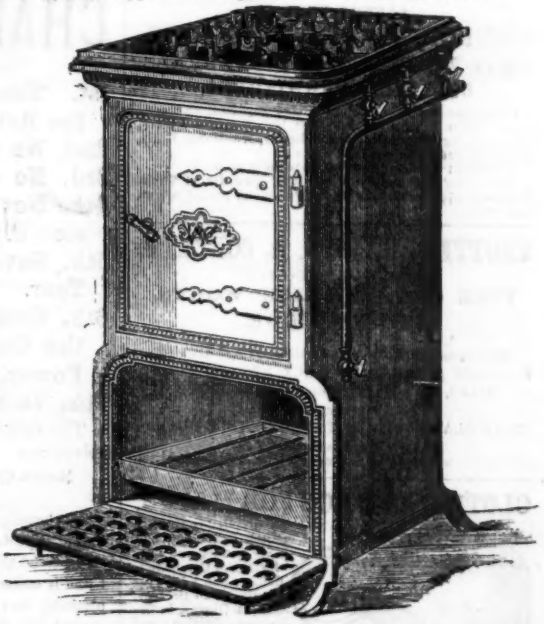

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MANUFACTURE EVERY DESCRIPTION OF
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For excellence of Fire-Clay Gas Retorts, and
"HONOURABLE MENTION" for
good quality of Fire-Bricks.
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Orders of any magnitude, for home and exportation, executed with all possible despatch.
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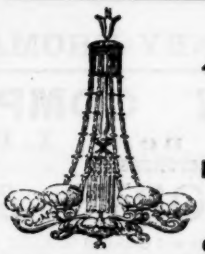
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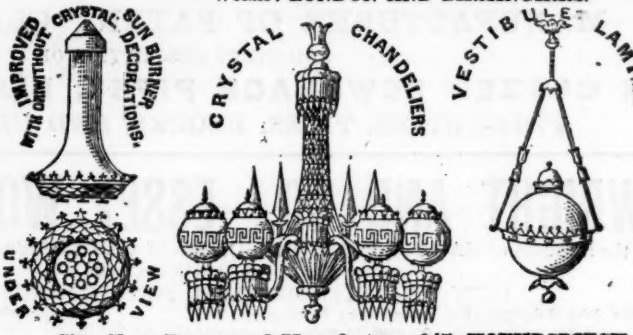

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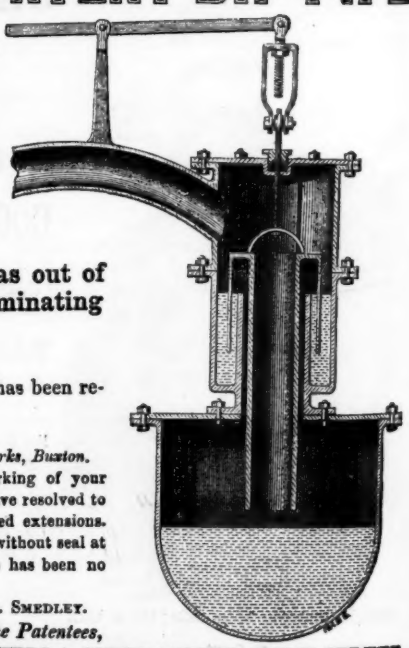
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4th, Never a choked Ascension Pipe.
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6th, Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
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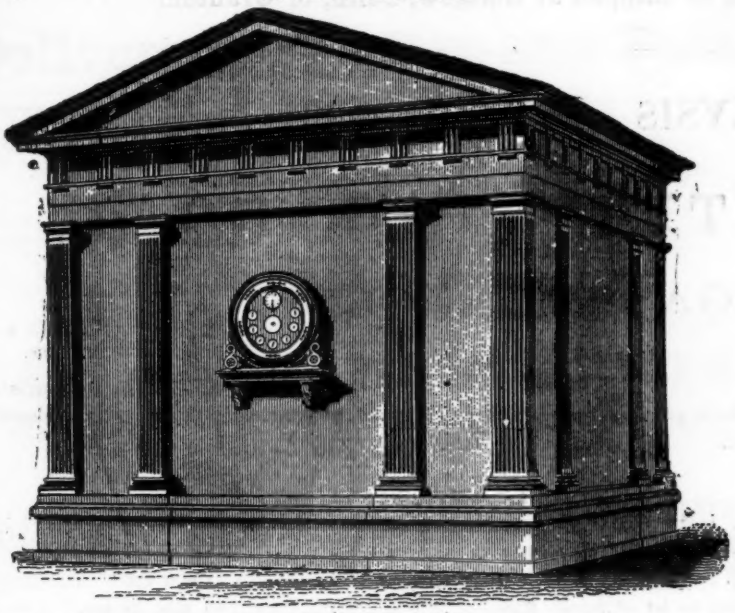

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RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

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"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artisan.*

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AND

Messrs. W. H. BRANCKER & Co.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

MALLEABLE IRON TUBE FOR GAS, WATER, AND STEAM.

AGENTS FOR THOMAS GLOVER & CO.'S

PATENT DRY GAS-METERS.

DELIVERY F.O.B. ON CLYDE.

Lists on application.

THOMAS READ & CO.,

BRAZILIAN IRON-WORKS,

MALTON, YORKS,

MANUFACTURERS OF

GAS and WATER PIPES,

Bends, Tees, and Irregulars,

AND

GENERAL FOUNDERS.

ESTIMATES and PRICES on APPLICATION.

WILSONTOWN GAS COAL.

This Coal bears a close resemblance to the Lesmahago seam. It has a first-class Coke, equal to the Lesmahago, and greater in quantity, and 10,538 Cubic Feet of 33·2 Candle Gas.

For rail in Scotland, or shipped at Glasgow, Leith, or Granton.

ANALYSIS AND REPORT

ON

CLIMPY TRIPPING COAL,

FOR GAS PURPOSES.

THE results of this analysis, as shown below, were got from actual working, and we have therefore the utmost confidence in placing it, along with that annexed, before you.

COMMERCIAL RESULTS.

Gas per ton of Coal—temperature 60°—barometer 30 inches	10,200 cubic feet.
Coke per ton of Coal	1,400 lbs.
Durability of one cubic foot of the gas, by jet of 5-inch flame	48 min. 24 sec.
Illuminating power in standard candles	14·9

REMARKS.

Being well acquainted with Durham and Northumberland Coals, I have no hesitation in saying that "CLIMPY TRIPPING" is superior to any (containing, besides, a greater proportion of pieces from 7 to 14 lbs. weight), with far less impurities for purification, more gas, and coke equal in calorific power. It has a large mixture of cannel nuts, which accounts for the good quality of the gas, at our photometer in town, 1000 yards from the works.

It is also a very superior Coal for mixing with oils, as by Mackenzie's patent; or with acid tar, or tar oil, shale grease, or other refuse from paraffin-works, as by system of Mr. Scott, of Musselburgh, or Mr. Foster, Portobello, the Coal being easily crushed.

Below are the results realized by myself, when mixed with acid tar from paraffin work, received by me in a solid state, having been run on to very fine dross. My charges were 2 cwt. tripping and 28 lbs. of acid tar, each retort, running six hours; with lighter charges I get more gas, but not so good quality, or so much coke.

Gas per ton of Coal	10,800 cubic feet.
Coke per ton of Coal	1,540 lbs.
Durability of one cubic foot of gas, by jet of 5-inch flame	58 min. 28 sec.
Illuminating power in standard candles	27·29

The first truck received being tried with very light charges (unmixed), and running five hours, I got 10,500 cubic feet of 14-candle gas; and I am confident, practical managers, with good retort-fittings (mine being very inferior), and exhausters at work, as I have seen generally at home and abroad, will take 11,000 feet of 13-candle gas from it. My retorts are 8 feet × 2 feet × 14 inches, D shape, heavy dip, and no exhauster.

These remarks of mine you may perhaps think rather lengthy, but they will be the more intelligible to any manager inquiring for Climpy Tripping.

L. MONK,
Engineer and Manager.

Lanark Gas-Works, April 20, 1874.

GAVIN PAUL,

WILSONTOWN GAS COAL WORKS & CLIMPY COLLIERY,

BY CARNWATH, N.B.

G. J. EVESON,

GAS COAL MERCHANT,

STOURBRIDGE.

Delivery per Rail to any Part.

CANNEL COAL.

ELLIS LEVER & CO.,

GAS COAL MERCHANTS,

107, PICCADILLY, MANCHESTER.

ALL CLASSES OF

ENGLISH, SCOTCH & WELSH CANNEL COALS.

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9300 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

RUSSEL'S BOGHEAD.

MUIRKIRK, No. 1, CANNEL

Yields 11,600 cubic feet of 34·3-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

MUIRKIRK, No. 2, CANNEL

Yields 10,700 cubic feet of 32·77-candle gas per ton, and 9½ cwts. of coke, containing 11 per cent. of ash.

OLD WEMYSS CANNEL

Yields 12,550 cubic feet of 33-candle gas per ton.

Prices and full Analyses on application.

DUKINFIELD CANNEL COAL.

THE DUNKIRK COAL COMPANY.

OFFICES:

ASTLEY DEEP PIT, DUKINFIELD.

ANALYSIS, PRICES, AND OTHER INFORMATION, ON APPLICATION AT THE ABOVE OFFICES.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

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DRY GAS-METERS,

PRIZE MEDALS. (INVENTED & PATENTED IN 1844,) PRIZE MEDALS.

LONDON, 1851; NEW YORK, 1853 PARIS, 1855. COMBINING ALL THE LATEST IMPROVEMENTS, LONDON, 1862; DUBLIN, 1865 PARIS, 1867.

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ALEXANDER WRIGHT & CO.,

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"WET" & "DRY" GAS-METERS

of the highest excellence.

STATION-METERS AND GOVERNORS,

STREET-LAMP REGULATORS.

TESTING APPARATUS

of the most perfect description for all purposes relating to Gas.

NOW READY.

"GAS MEASUREMENT AND GAS-METER TESTING," by F. W. HARTLEY, A. Inst. C.E.
Third Edition, cloth boards, 2s.; per post, 2s. 2d.

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Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,
Governors, Test Holders, &c., &c.

LONDON OFFICE: 106, CANNON STREET, E.C.

SMALL GAS COOKING STOVE, No. 133, 12 in. wide. £1 15s.

BILLING AND CO.,

"HOLBORN WORKS,"

SMART'S BUILDINGS, HIGH HOLBORN,

AND

90, HATTON GARDEN, LONDON,

GAS STOVE MANUFACTURERS.

COPY TESTIMONIAL.

Northampton Gaslight Company,
Northampton, May 14, 1874.

Messrs. Billing and Co.,

Gentlemen,—We have sold a large number of your Gas Cooking Stoves during the last twelve months, and they have, without exception, given the greatest satisfaction. I consider your Stove the best I have seen.

I remain, yours obediently,
JOHN EUNSON, Jun., Manager.

90, Hatton Garden, London.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, August 11, 1874.